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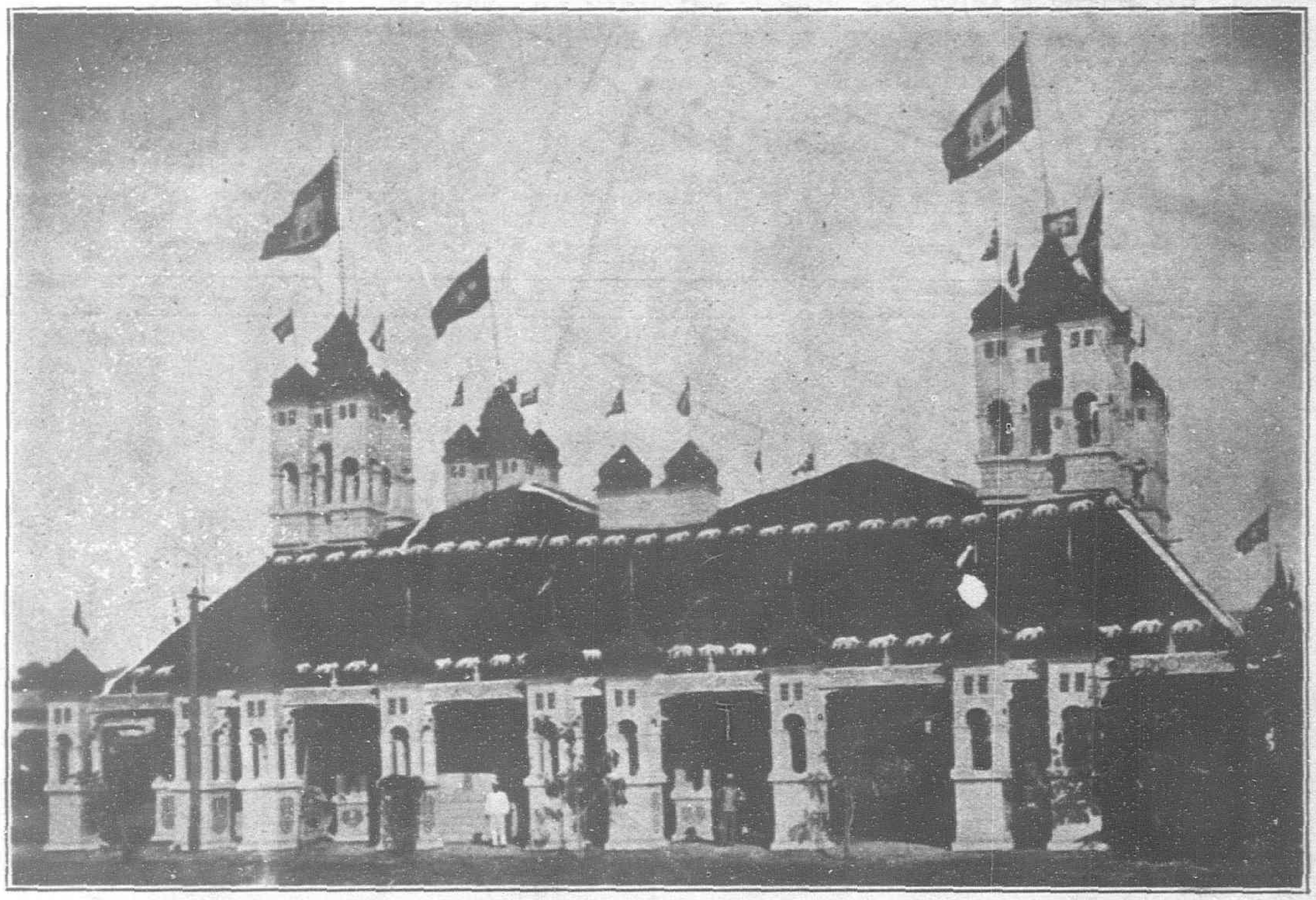
THE FAR EASTERN REVIEW

VOL. VIII.—No. 8. MANILA AND SHANGHAI, JANUARY, 1912. 25 cents, U. S. Cy.

The Royal State Railways of Siam

* * *

Philippine Public Works



ROYAL PAVILION AT THE BANGKOK TERMINUS OF THE SIAM ROYAL STATER AILWAY AT THE OPENING OF LINE TO PETRIEU IN 1908

The Philippine Railways

* * *

General News and Comment

Hongkong and Shanghai Banking Corporation

DEPOSITORY OF THE GOVERNMENT OF THE PHILIPPINE ISLANDS

Capital (Paid in Cash)........$15,000,000
Sterling Reserve Fund......$15,000,000
Silver Reserve Fund...........$16,750,000
Reserve Liability of Prop'rs.$15,000,000

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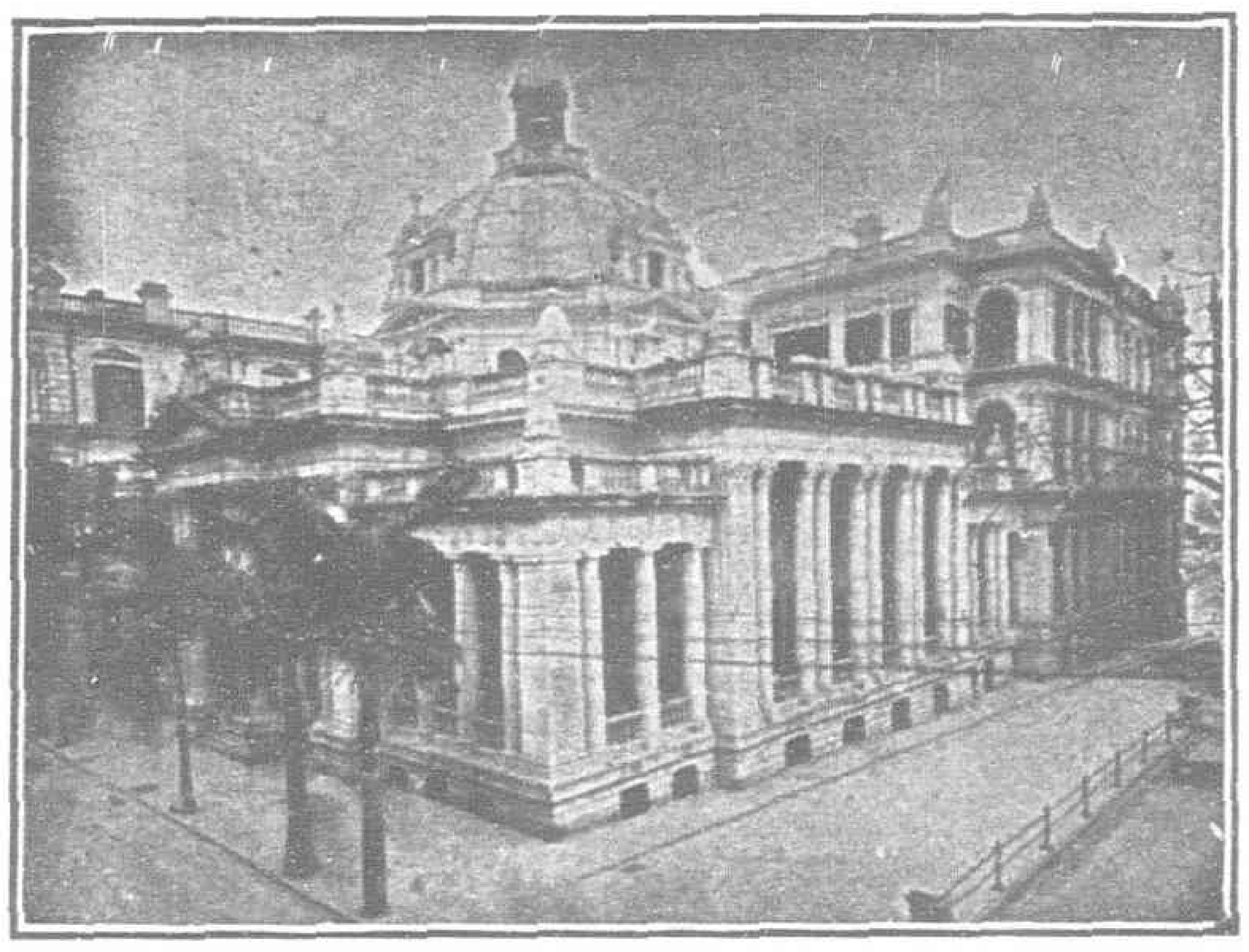

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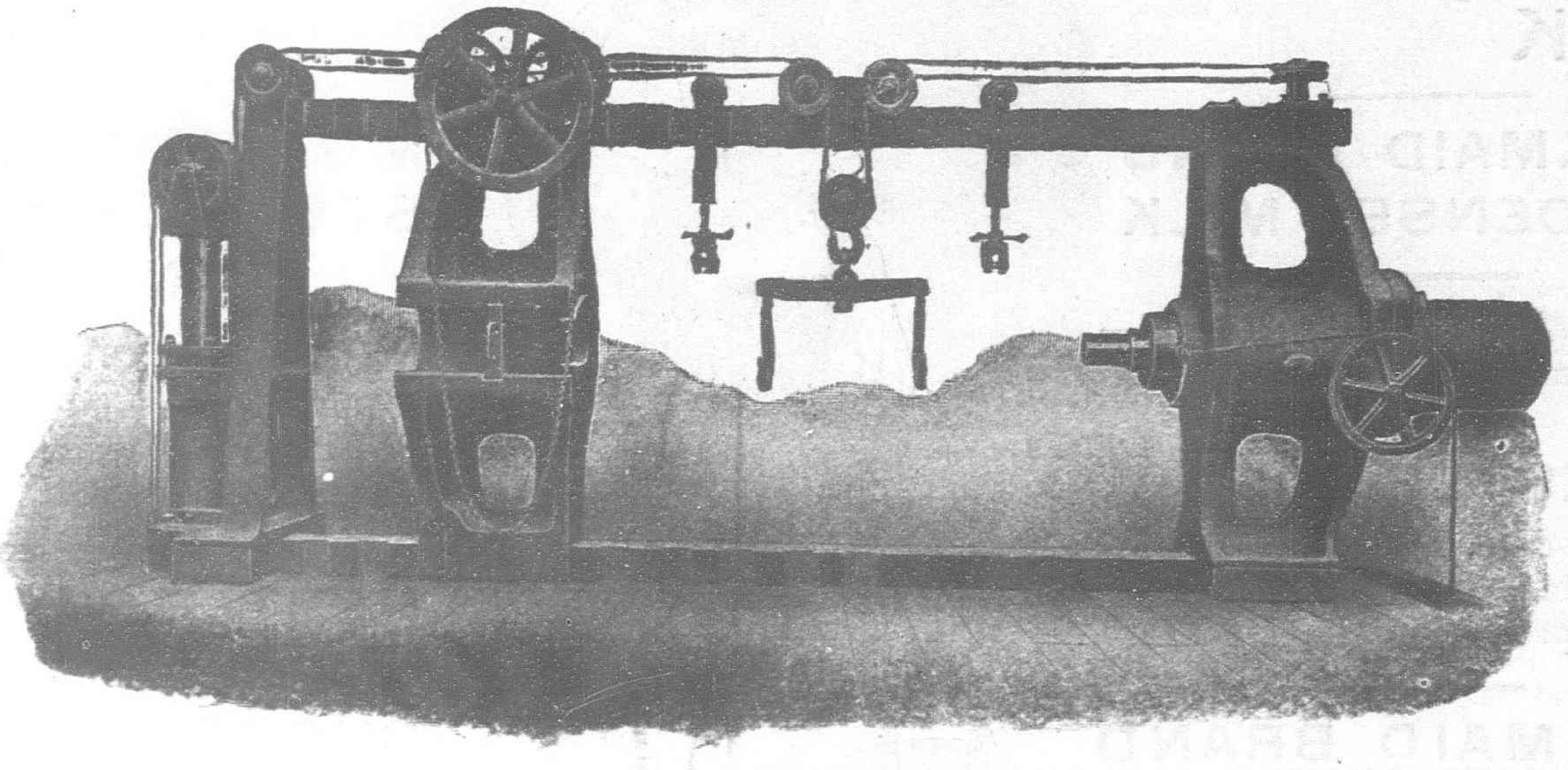

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Reserve Funds....................Kpg. Tls. $1,716,797

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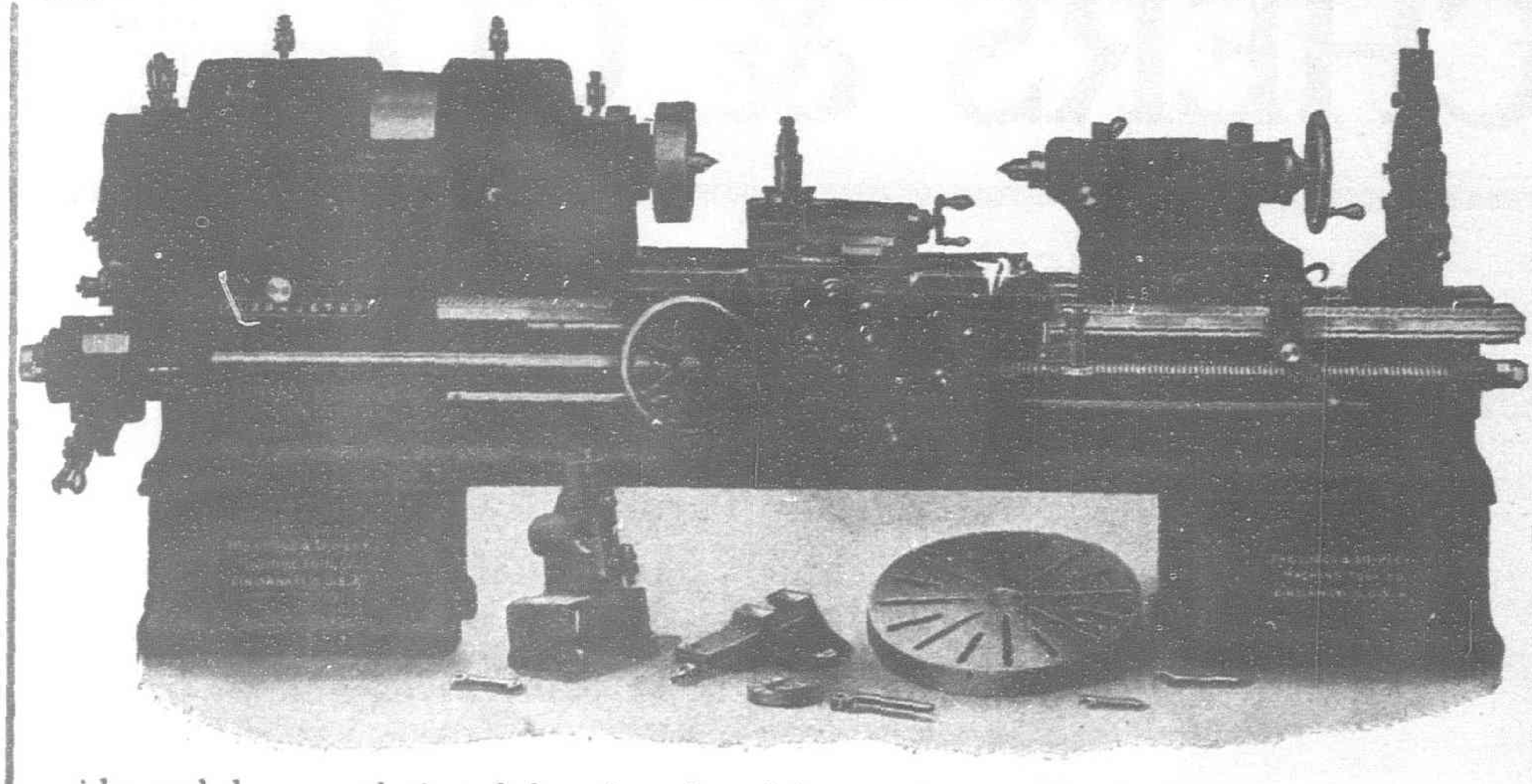

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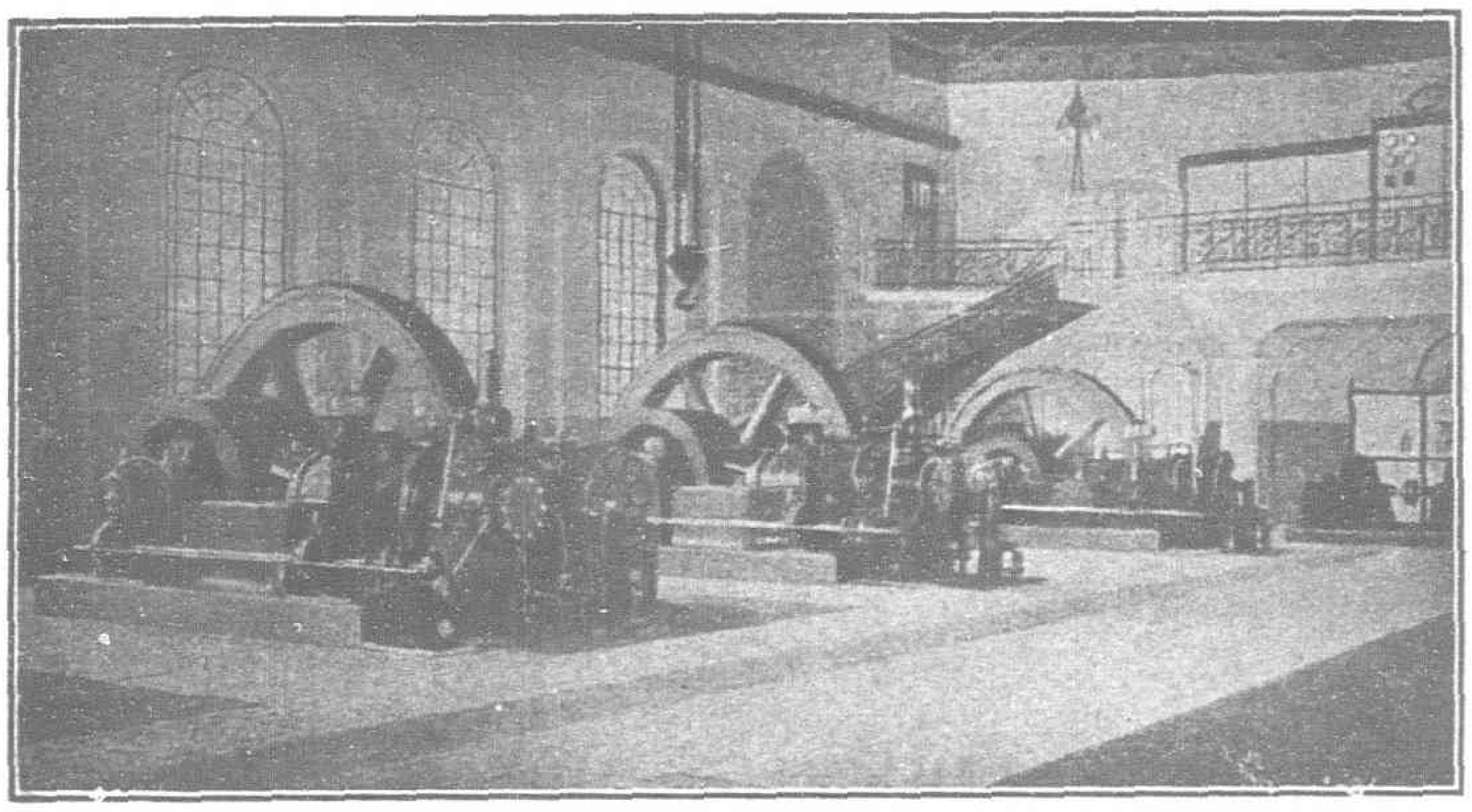

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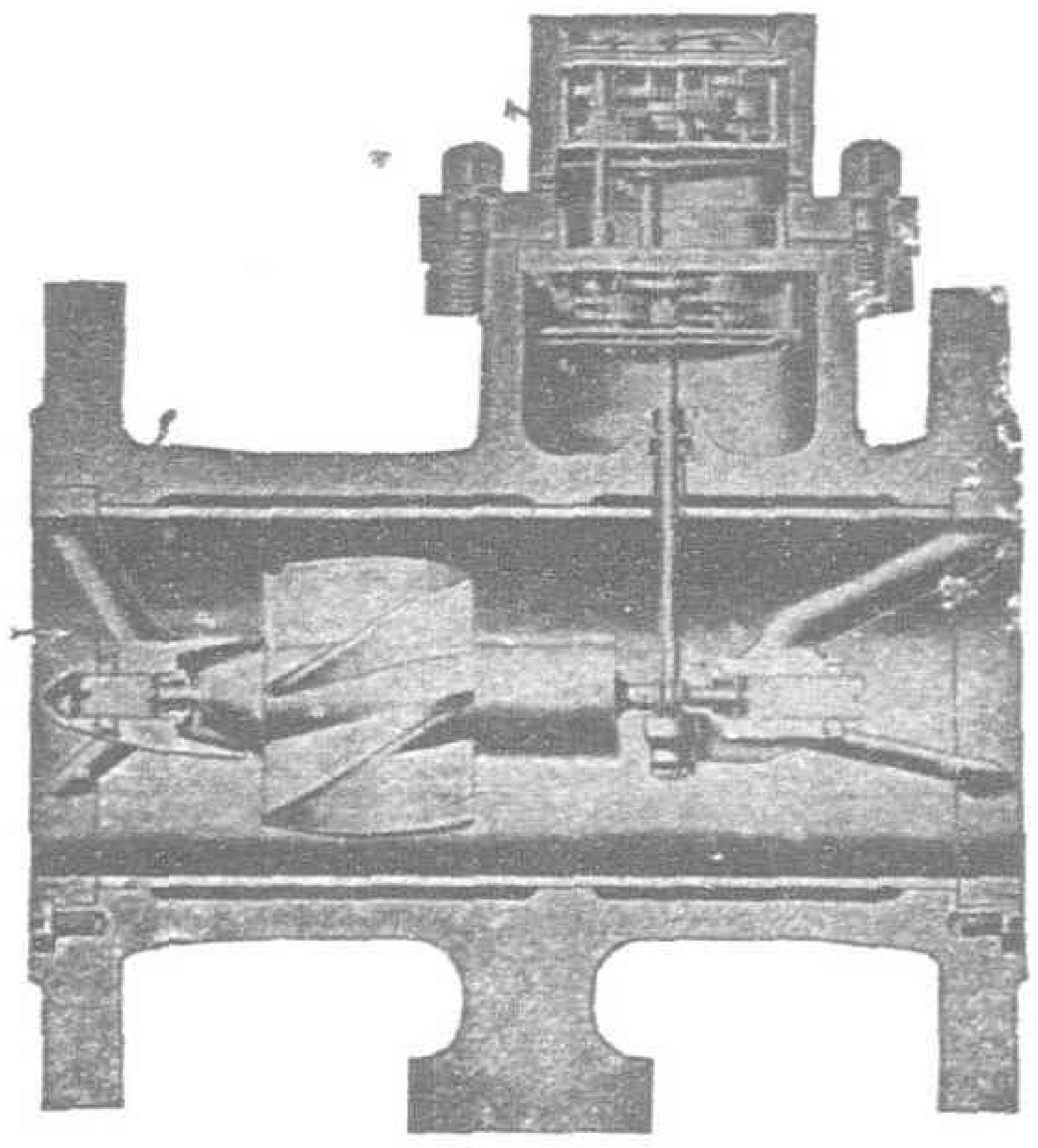

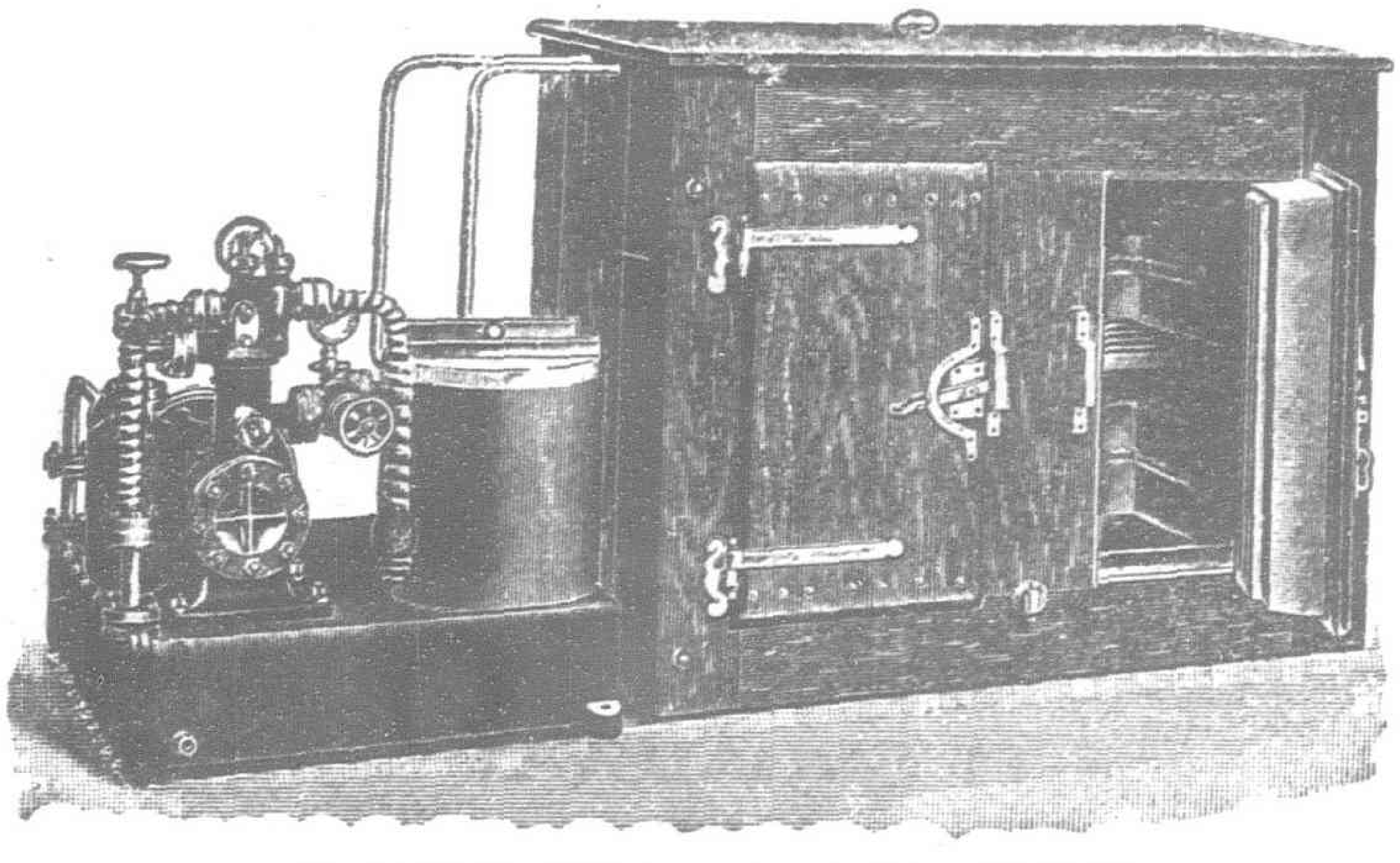

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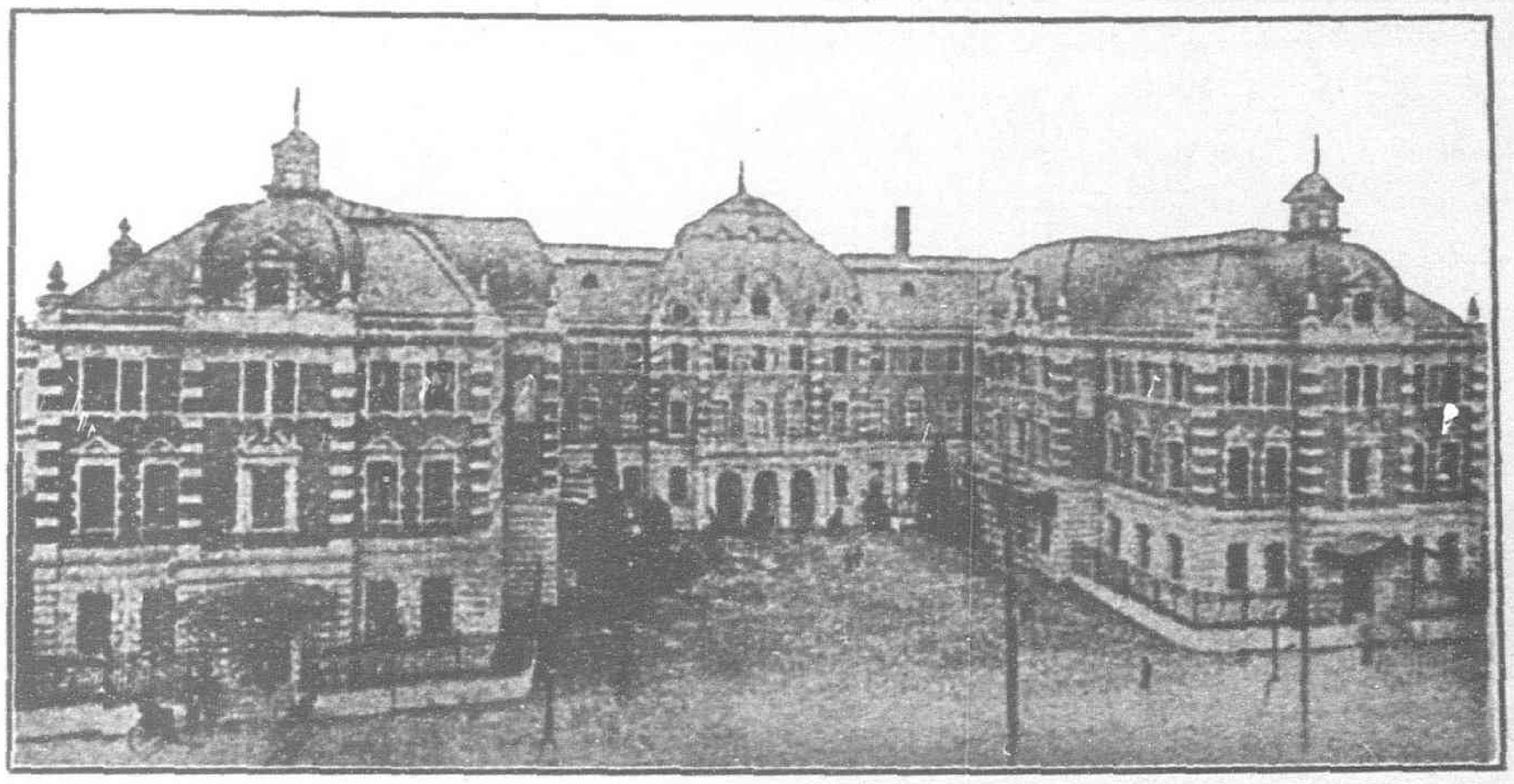

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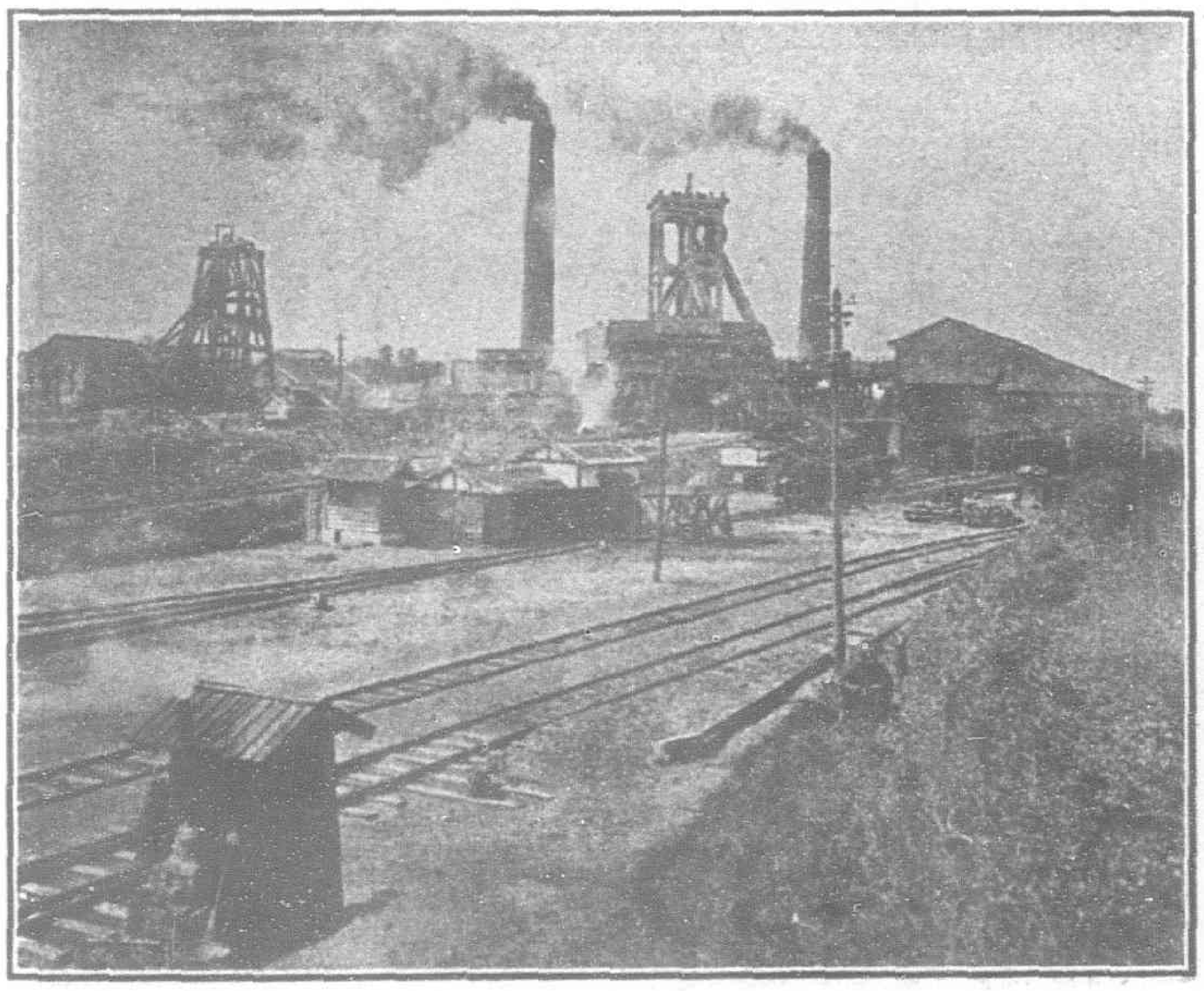

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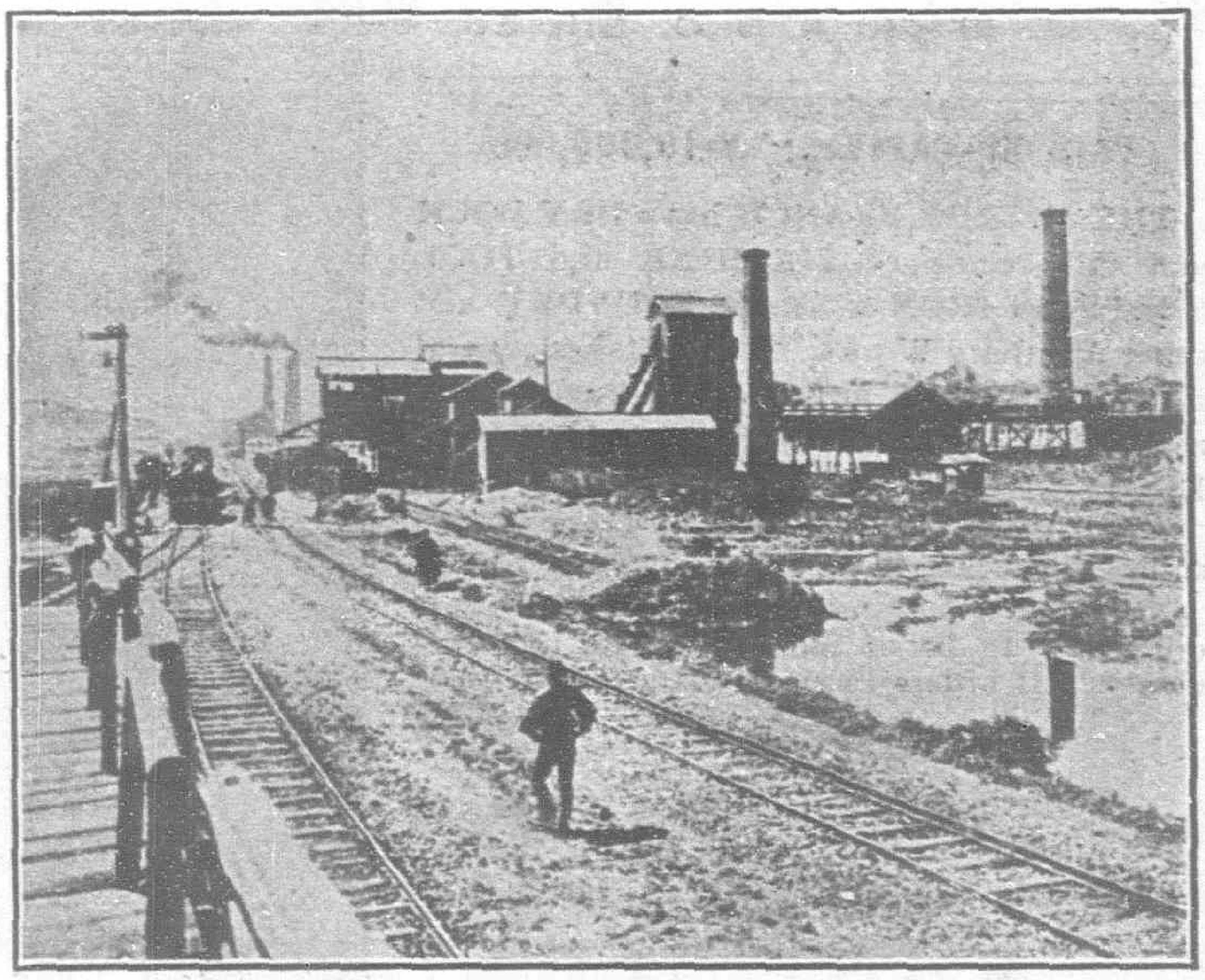

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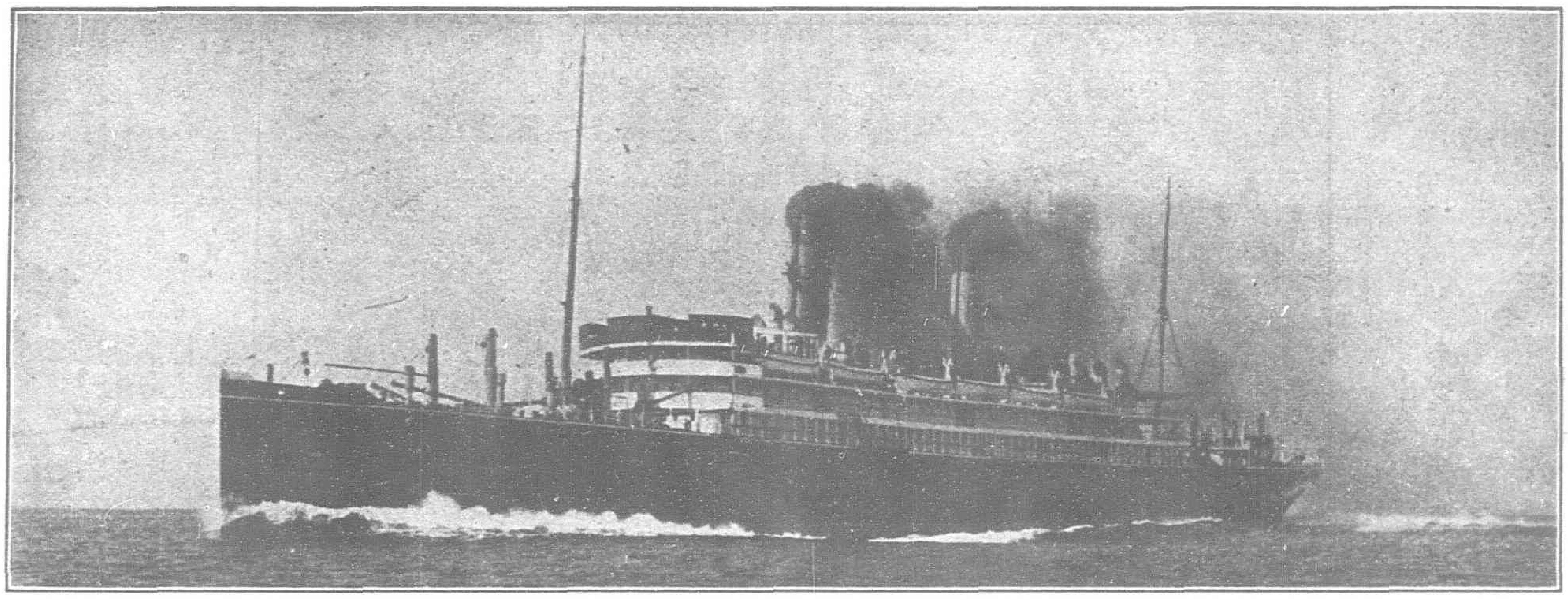

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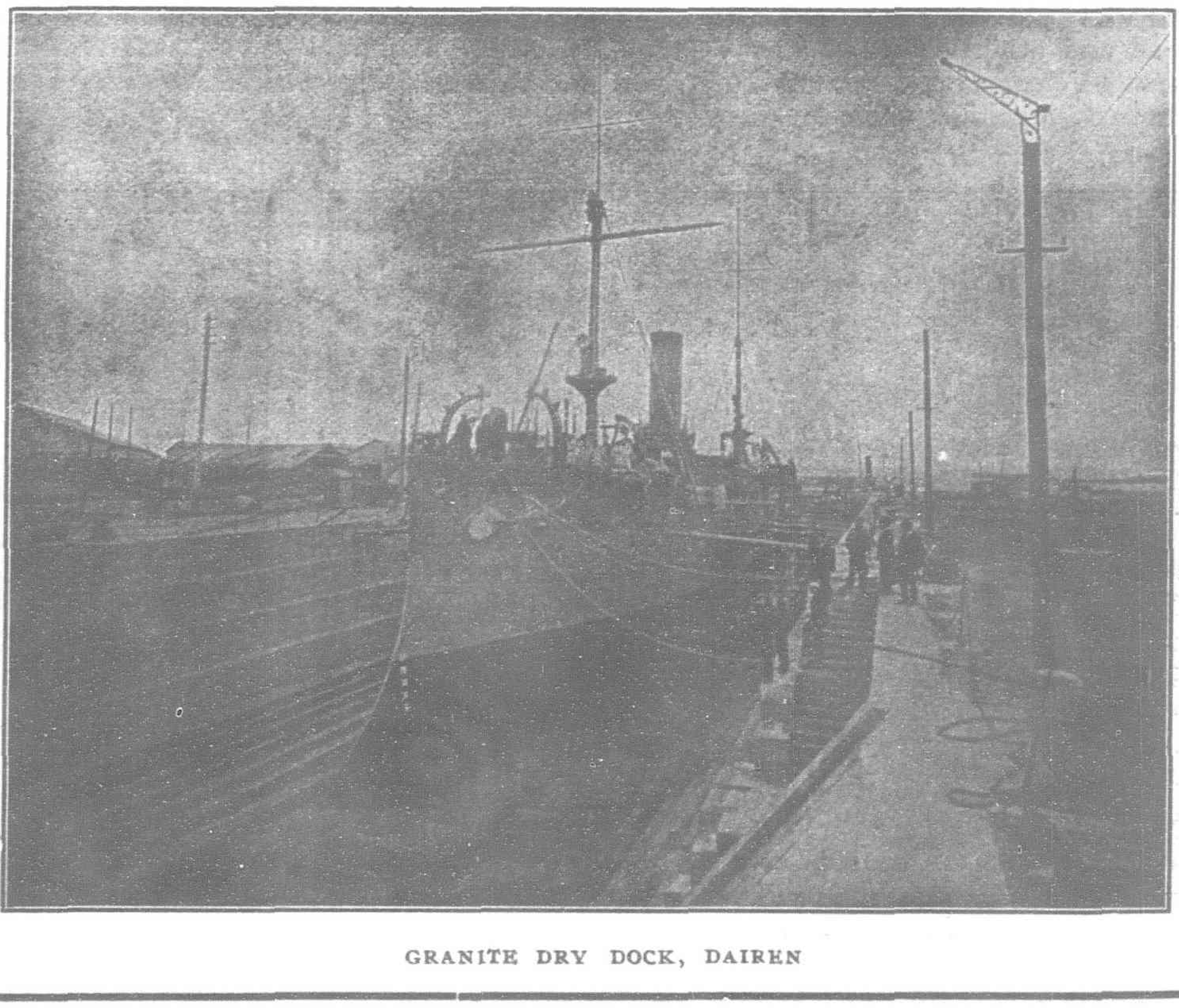

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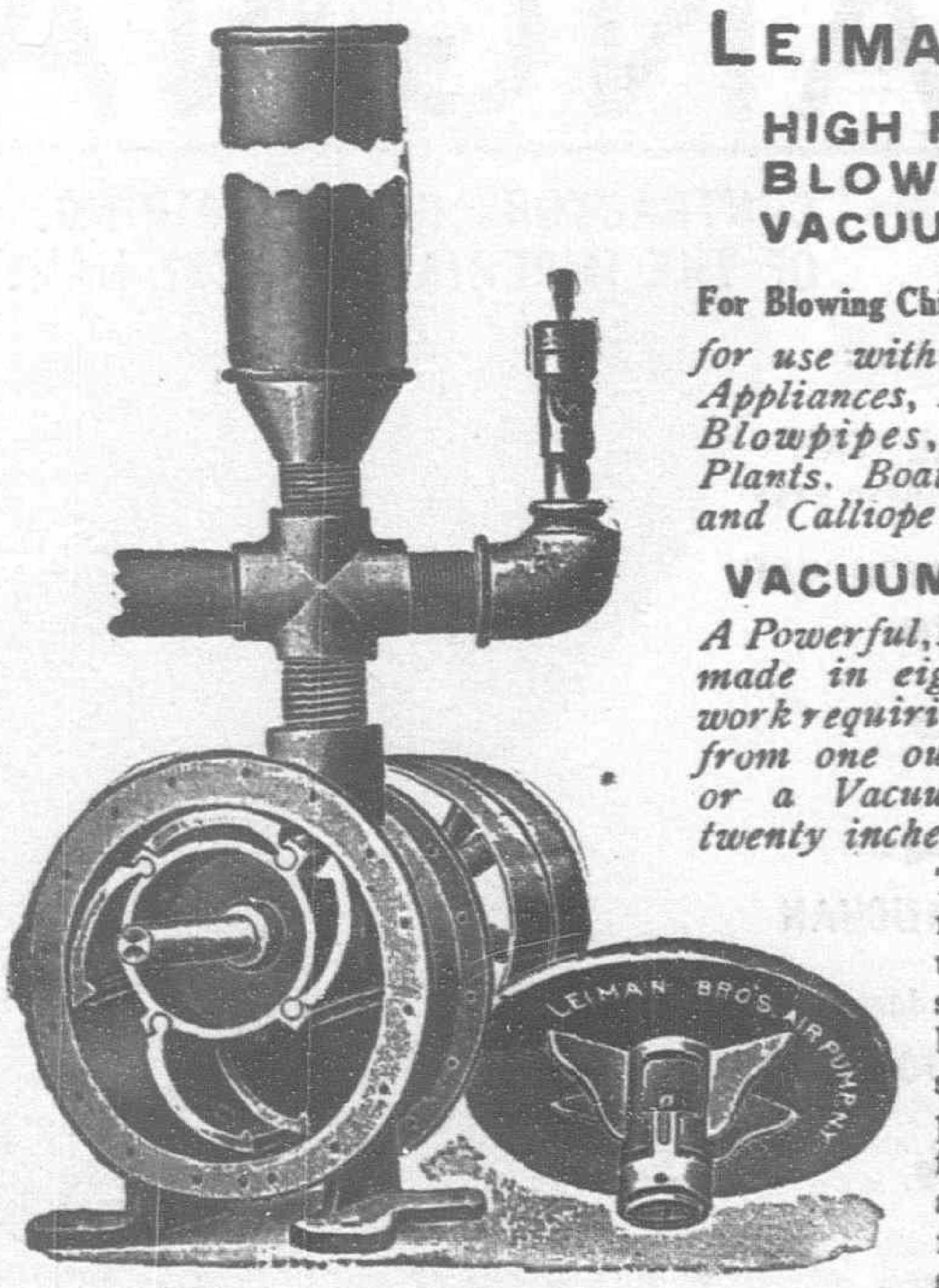

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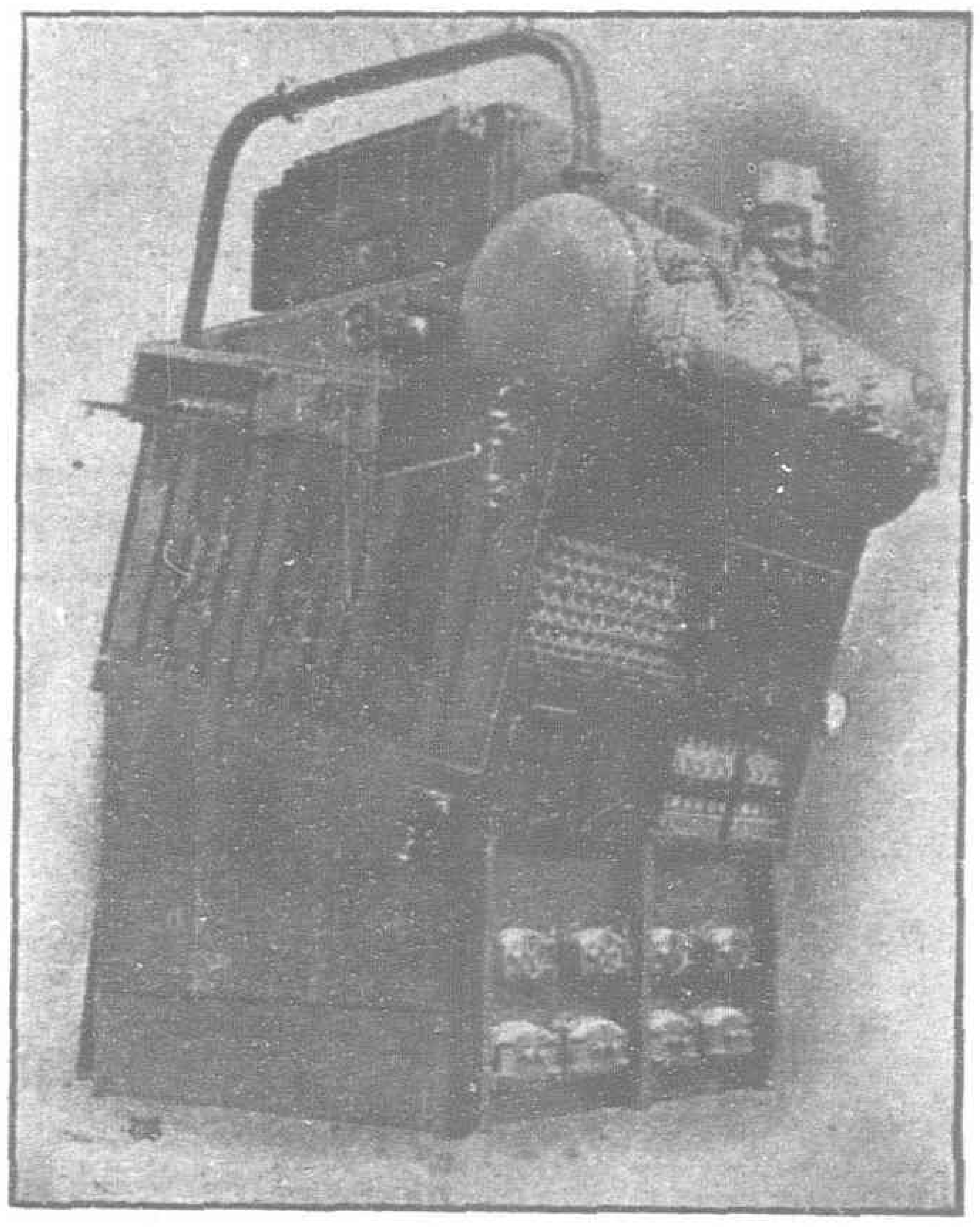

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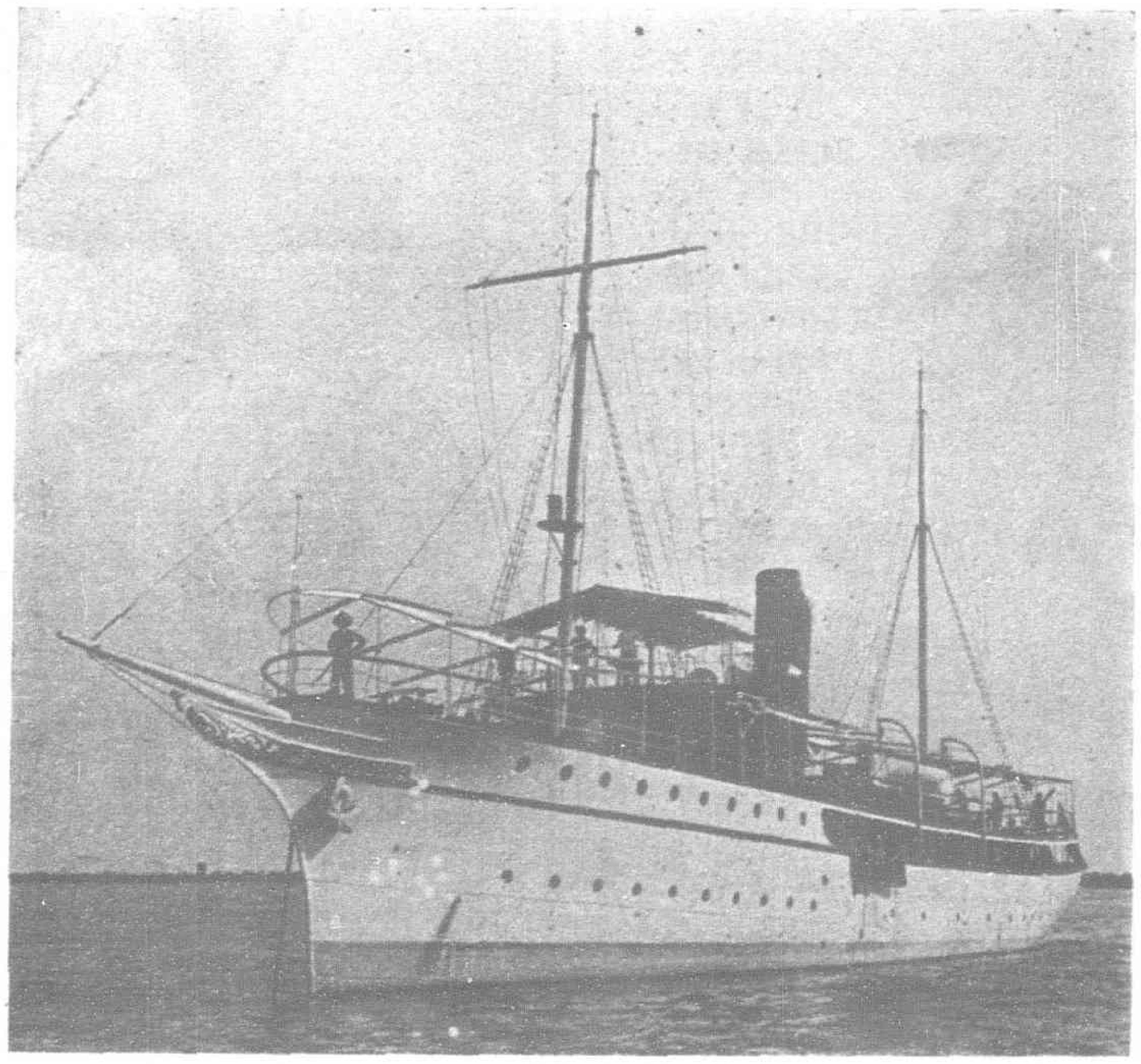

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Length over all, 385′; length on blocks, 575′; water on sill, 19′; dock entrance, top 70′, bottom, 60′.

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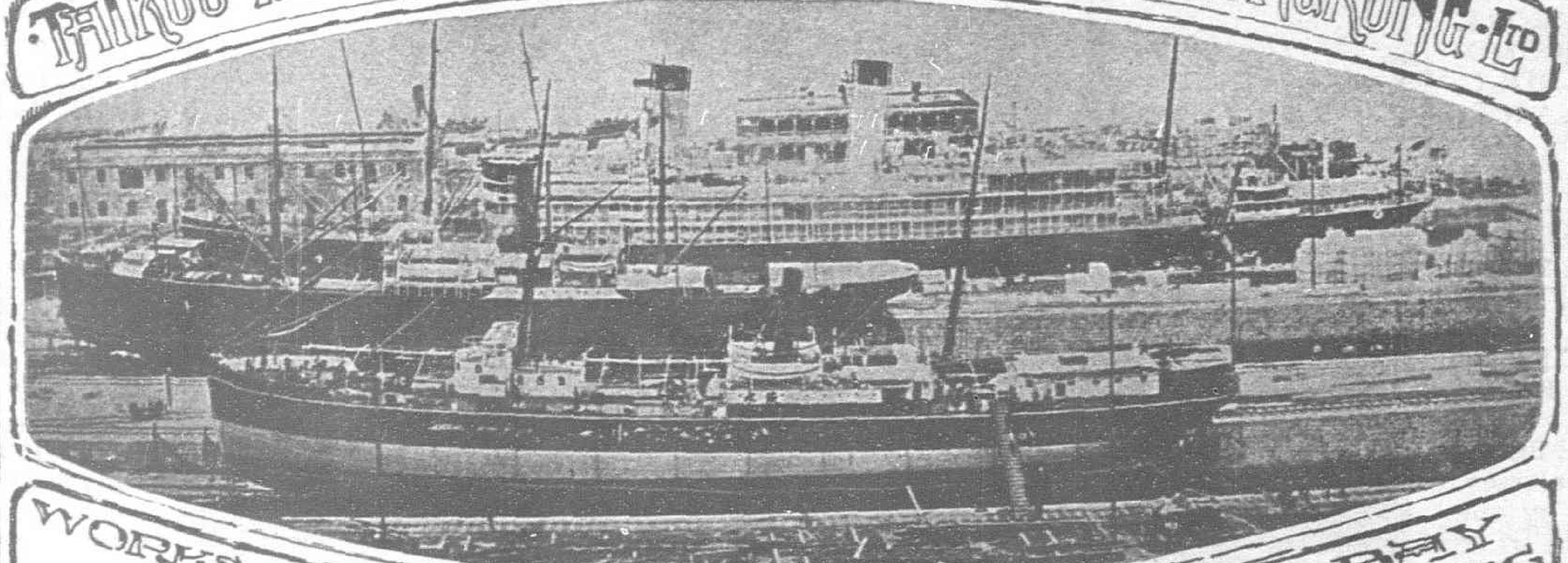

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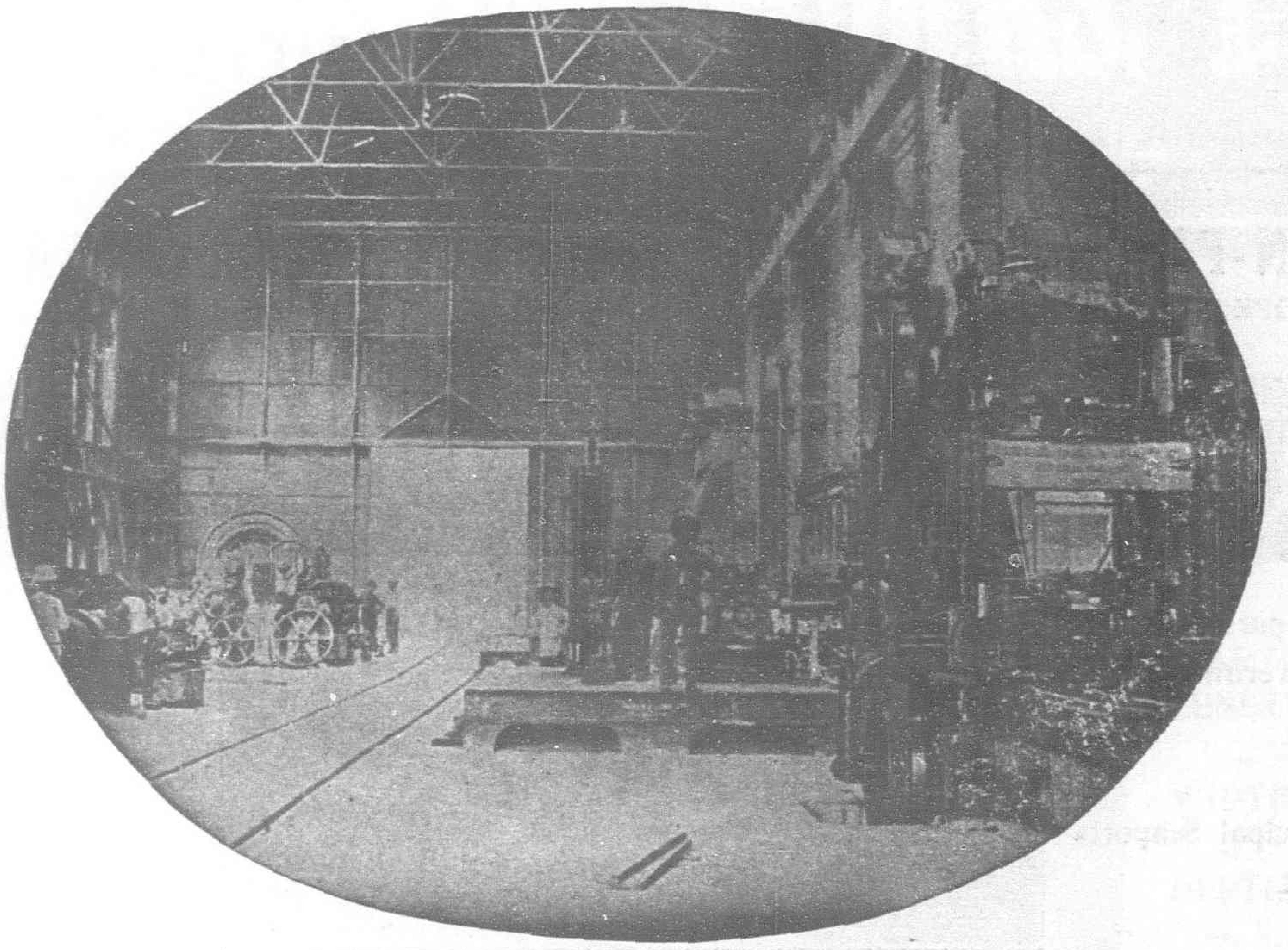

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THE POWER FOR THE ESTABLISHMENT is generated by Gas Producers, on the Mond System, supplying 4 Cockerill Gas Engines of 3,000 collective horse power, driving Electrical Generators, and is transmitted throughout the Works by means of Electrical Motors.

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ALL CLASSES of COCKS, VALVES and FITTINGS in IRON and BRASS supplied.

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A LARGE STOCK of STEEL and IRON PLATES, BARS and ANGLES, always in hand.

The Company possesses SIX GRANITE DOCKS and TWO PATENT SLIPWAYS and these are equipped for EXPEDITIOUS WORK. Our plant is of the most modern type throughout.

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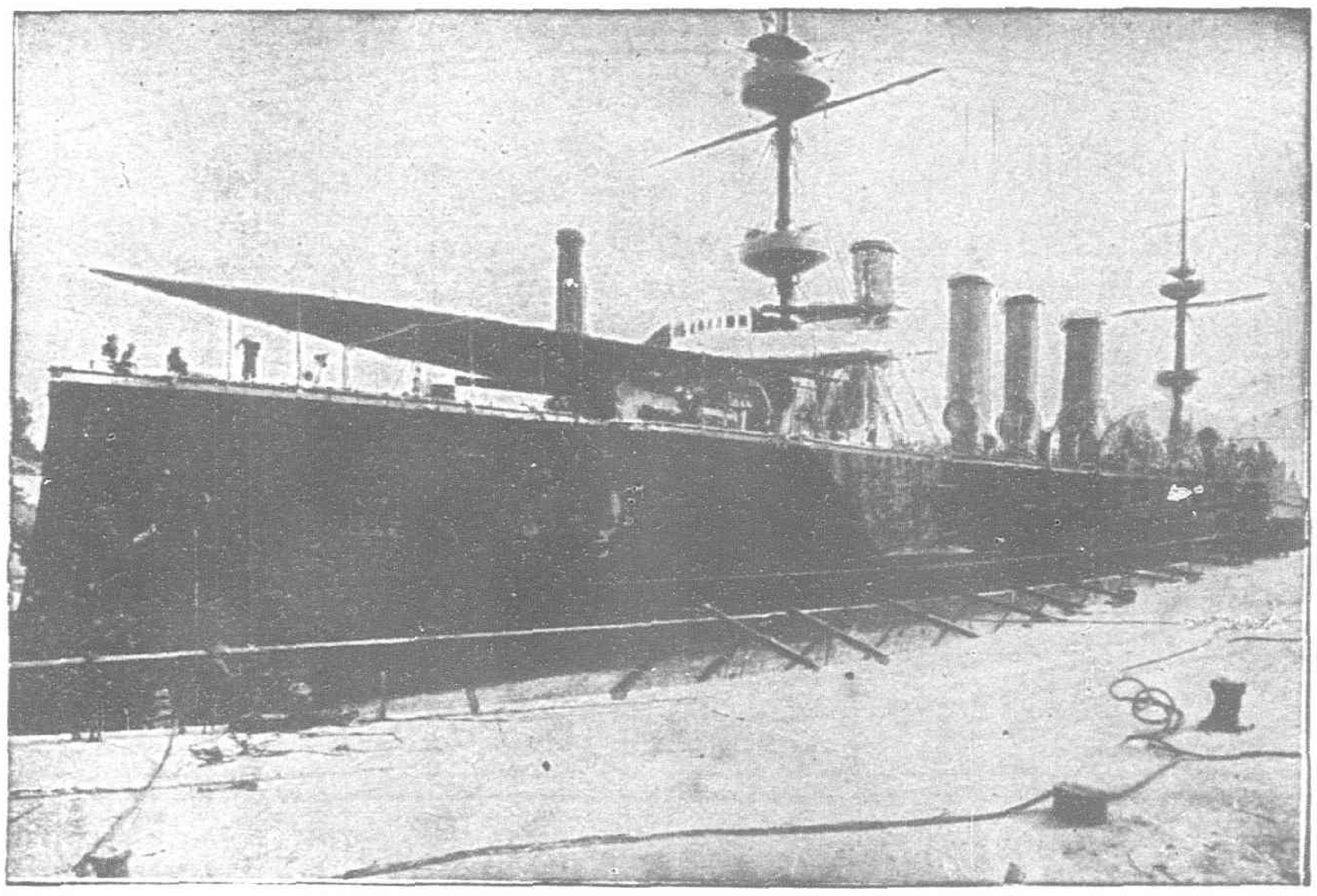

H. M. S. POWERFUL IN NO. 1 DOCK, KOWLOON

The Dimensions of Docks and Slips are as follows:—

Name of Dock or Slip	*Length on Keel Blocks*	*Entrance Breadth*	*Depth Over Sill at Ordinary Spring Tides*	*Rise of Tide*	
				Springs	*Neaps*
KOWLOON	*Feet*	*Feet*	*Feet*	*Feet*	*Feet*
No. 1 Dock, Kowloon........	700	86 ft. top 70 ft. bottom	30′	7′ 6″	3
No. 2 Dock, Kowloon	371	74′	18′ 6″	7′ 6″	—
No. 3 Dock, Kowloon........	264	49′ 3″	14′	7′ 6″	—
Patent Slip, No. 1, Kowloon...	240	60′	14′	7′ 6″	—
Patent Slip, No. 2, Kowloon...	220	60′	12′	7′ 6″	—
TAI-KOK-TSUI					
Cosmopolitan Dock..........	466	85′ 6″	20′	7′ 6′	—
ABERDEEN					
Hope Dock	430	84′	23′	7′ 6″	—
Lamont Dock................	333	64′	16′	7′ 6″	—

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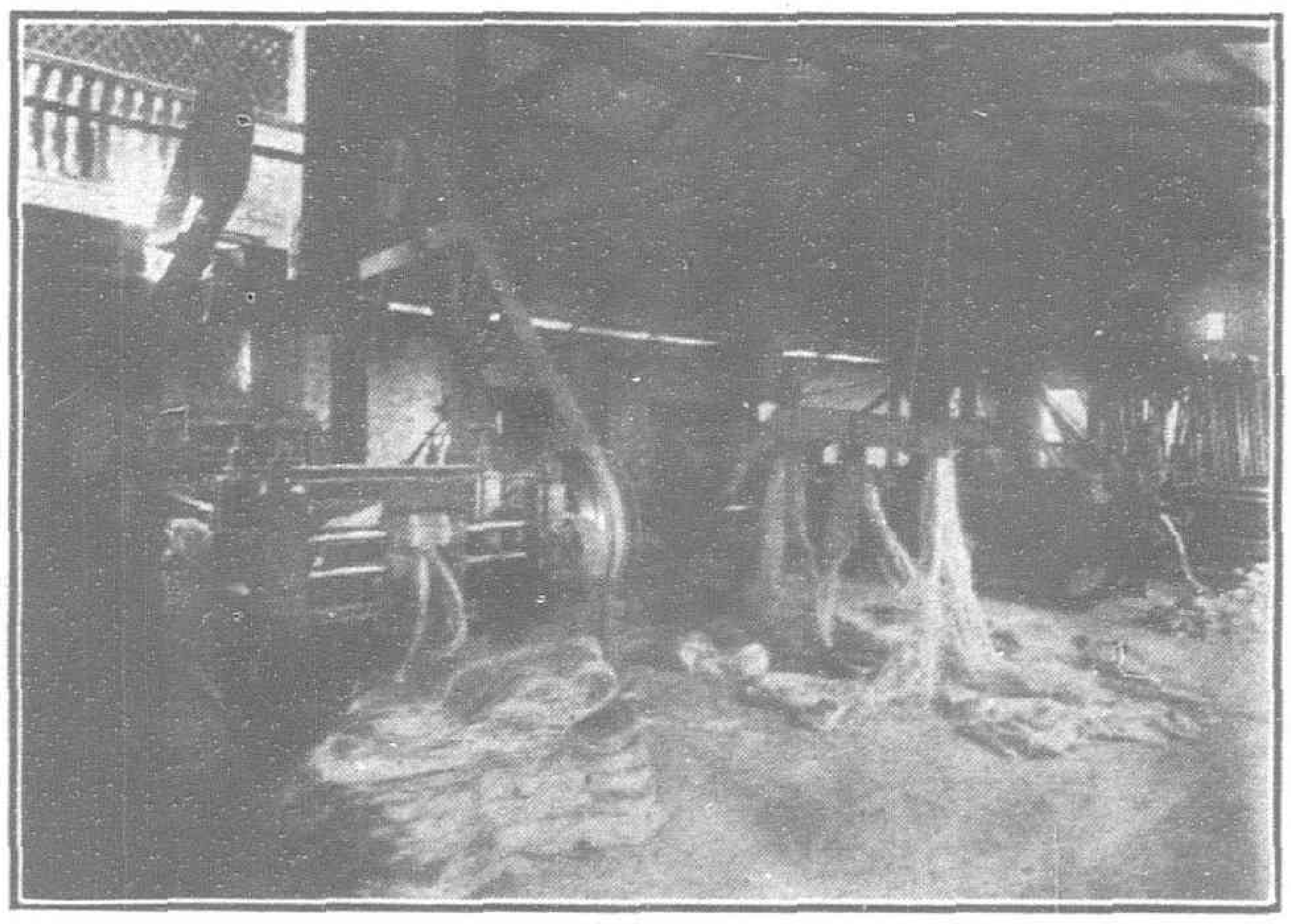

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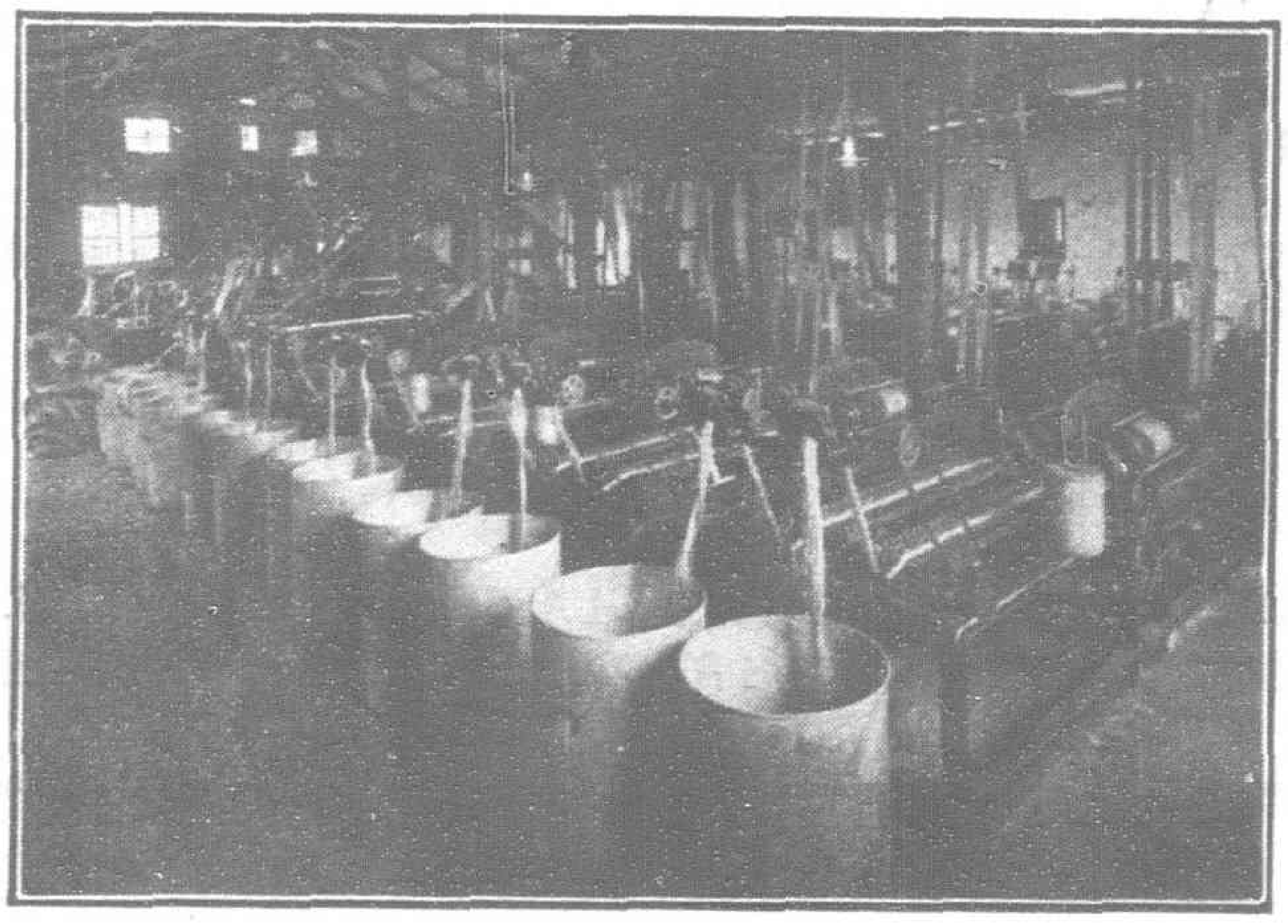

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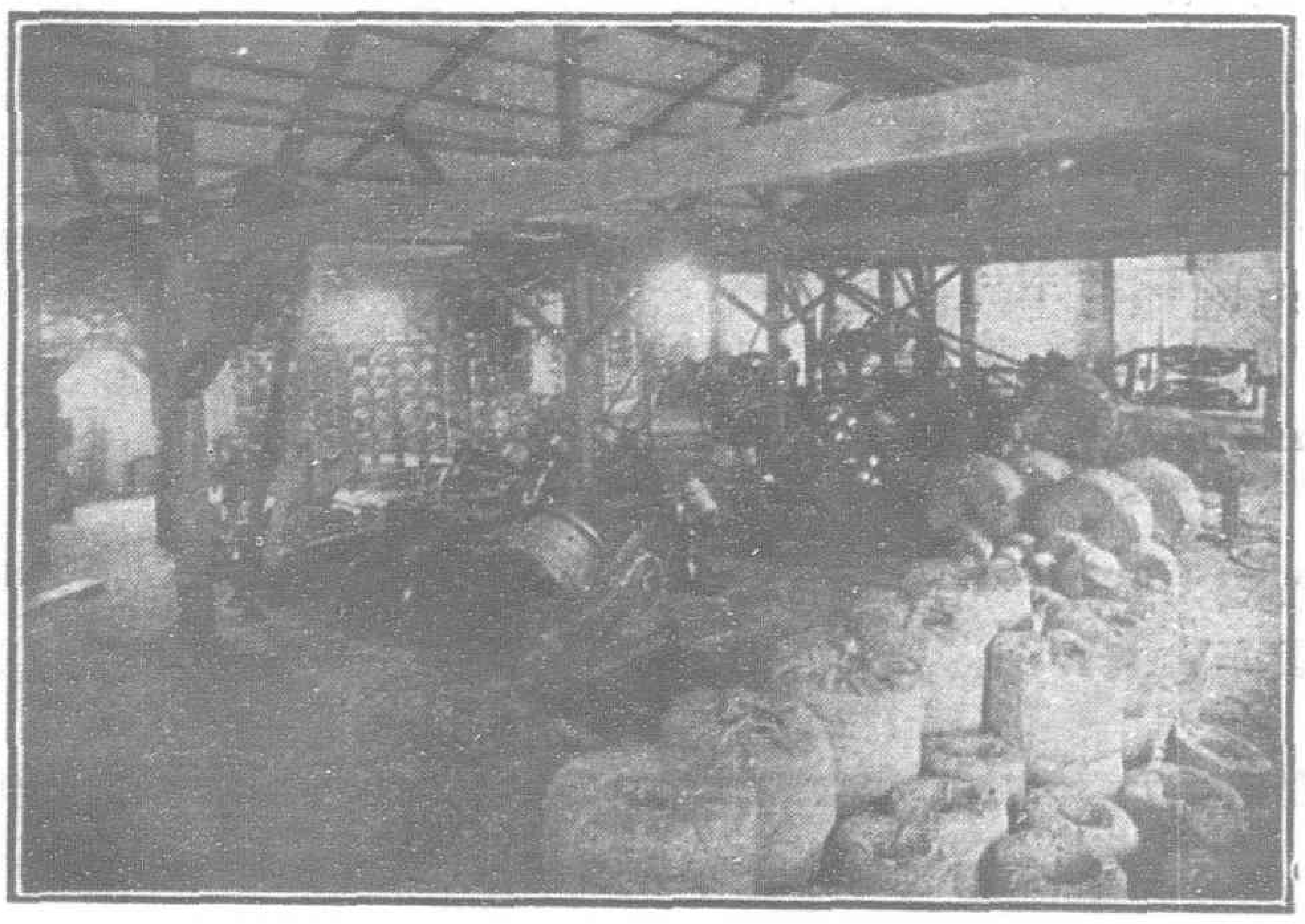

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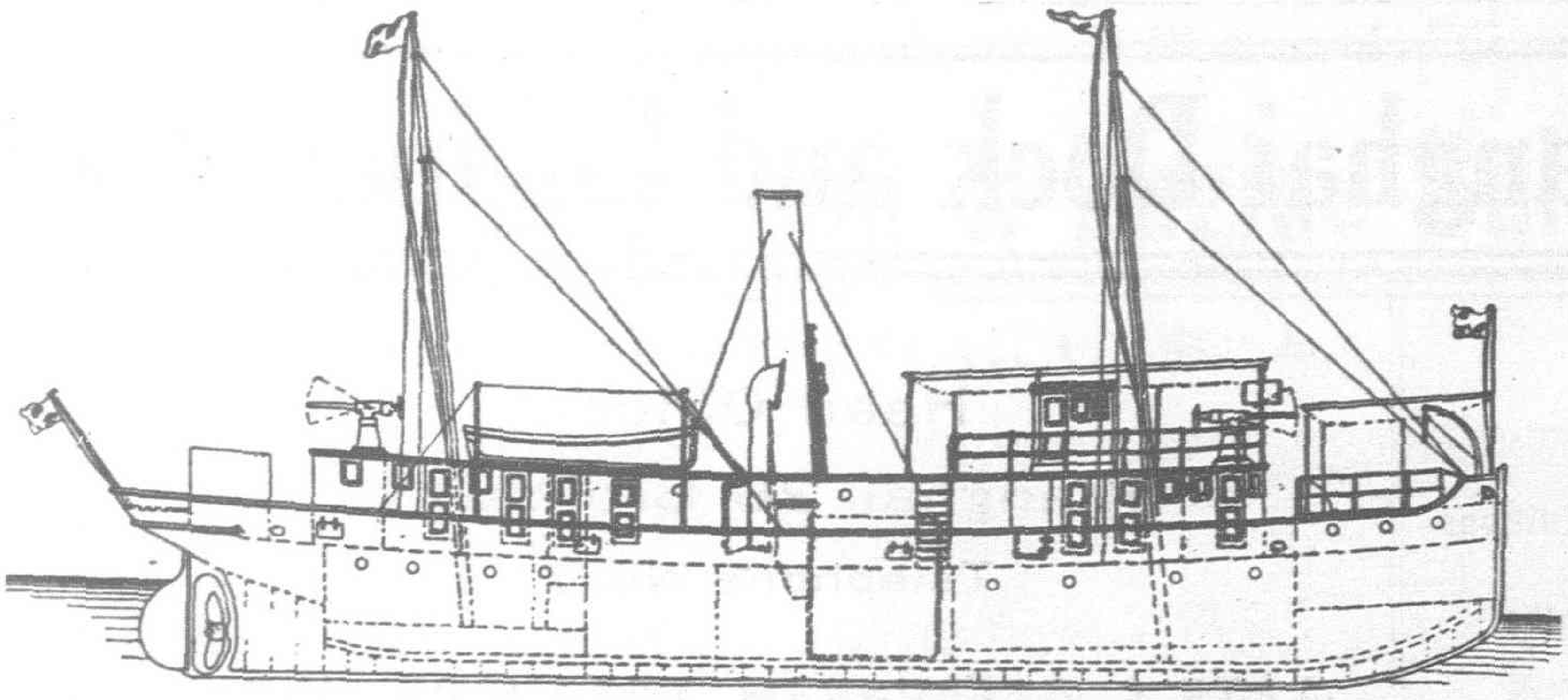

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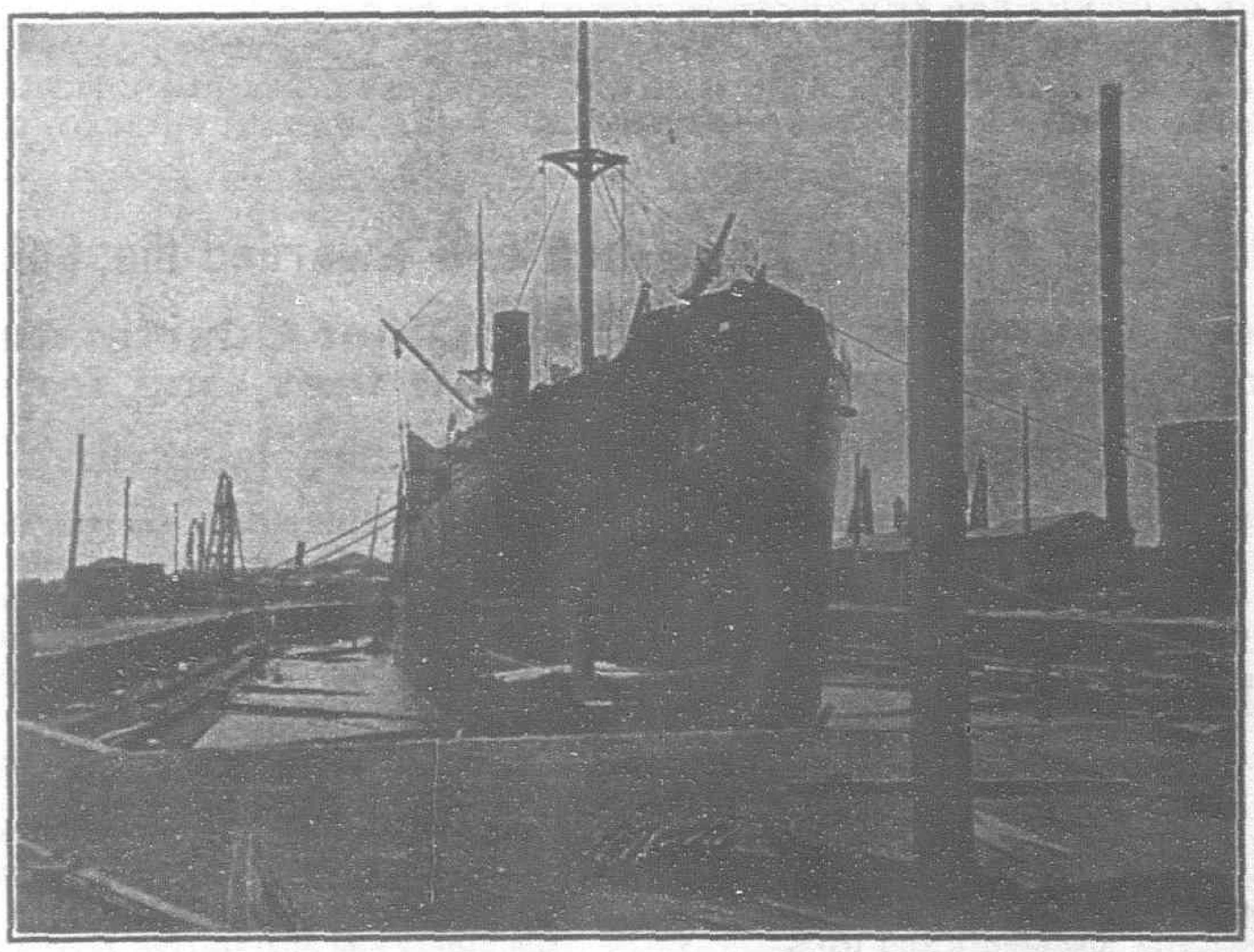

VIEW OF YANGTSZEPOO DOCK

PARTICULARS OF DOCK
LENGTH ON BLOCKS 455'0"
" OVERALL - 469'0"
WIDTH, ENTRANCE 74'0"
" SILL - - 64'0"
DEPTH ON SILL, (H. W. O. S. TIDES) - - - 21'0"
DEPTH ON 3'0" BLOCKS (H. W. O. S. TIDES) 19'0"
PUMPS CAN EMPTY DOCK WITHOUT VESSEL IN, IN 3½ HOURS.
WORKSHOPS LOCATED AT HEAD OF DOCK

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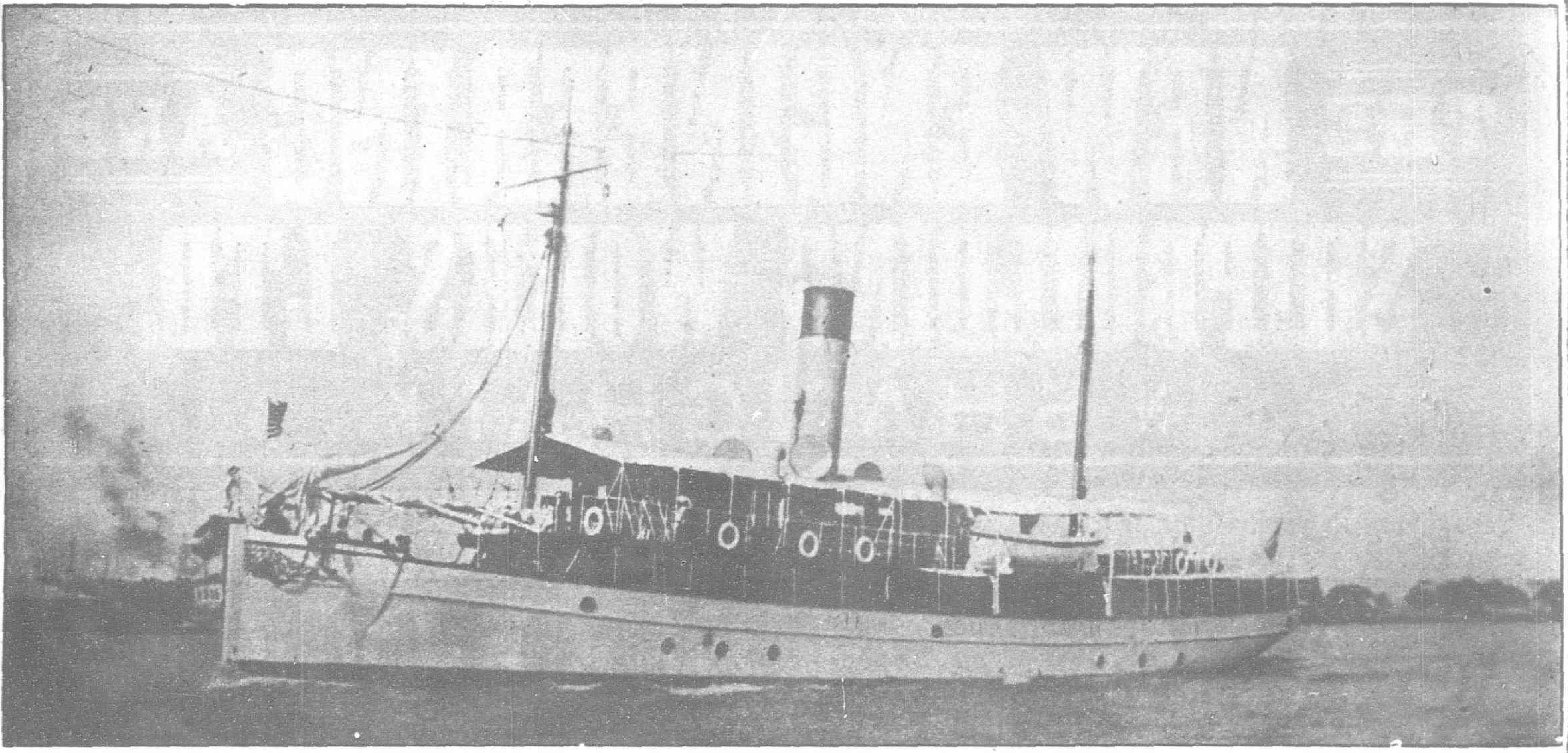

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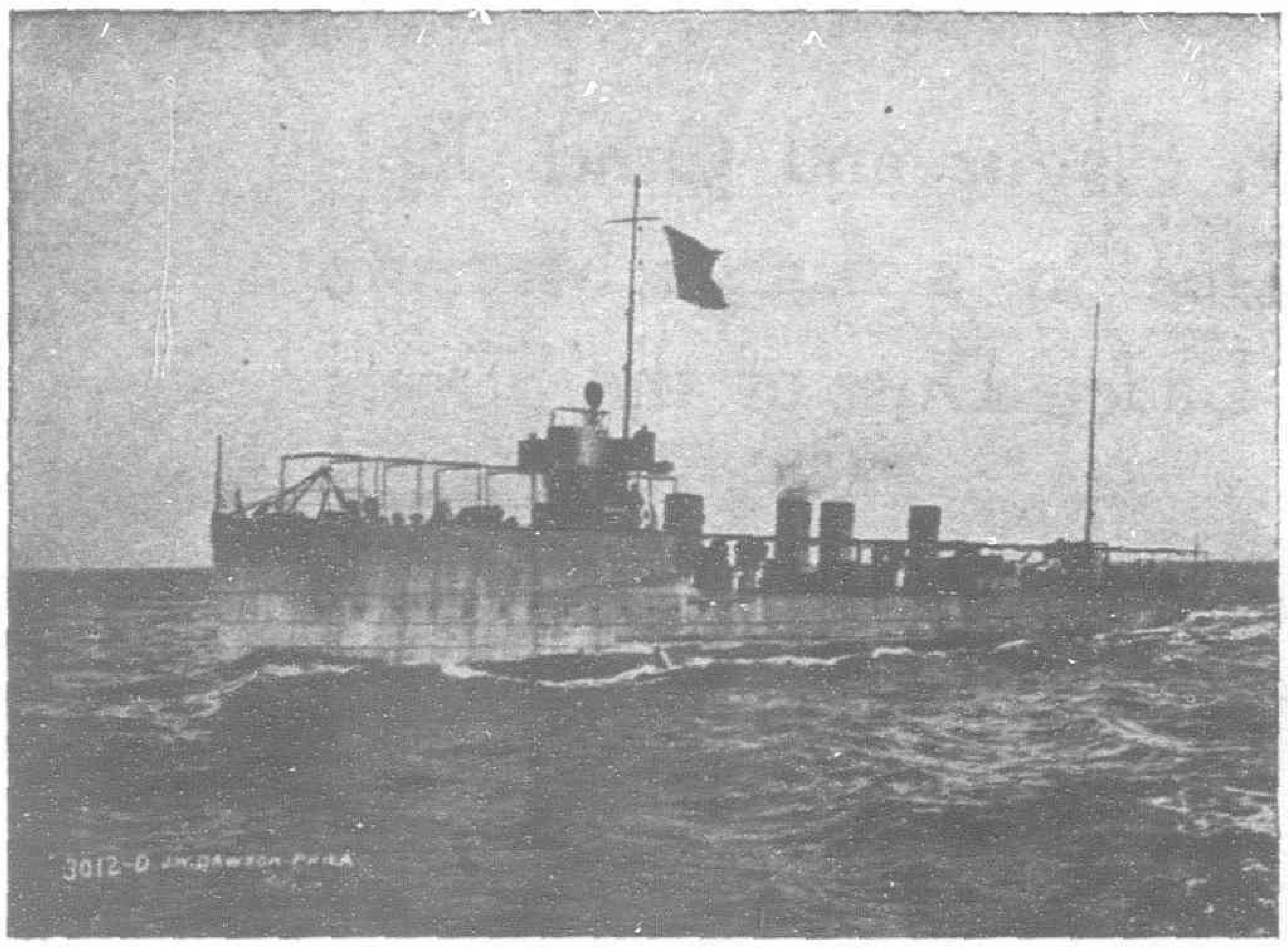

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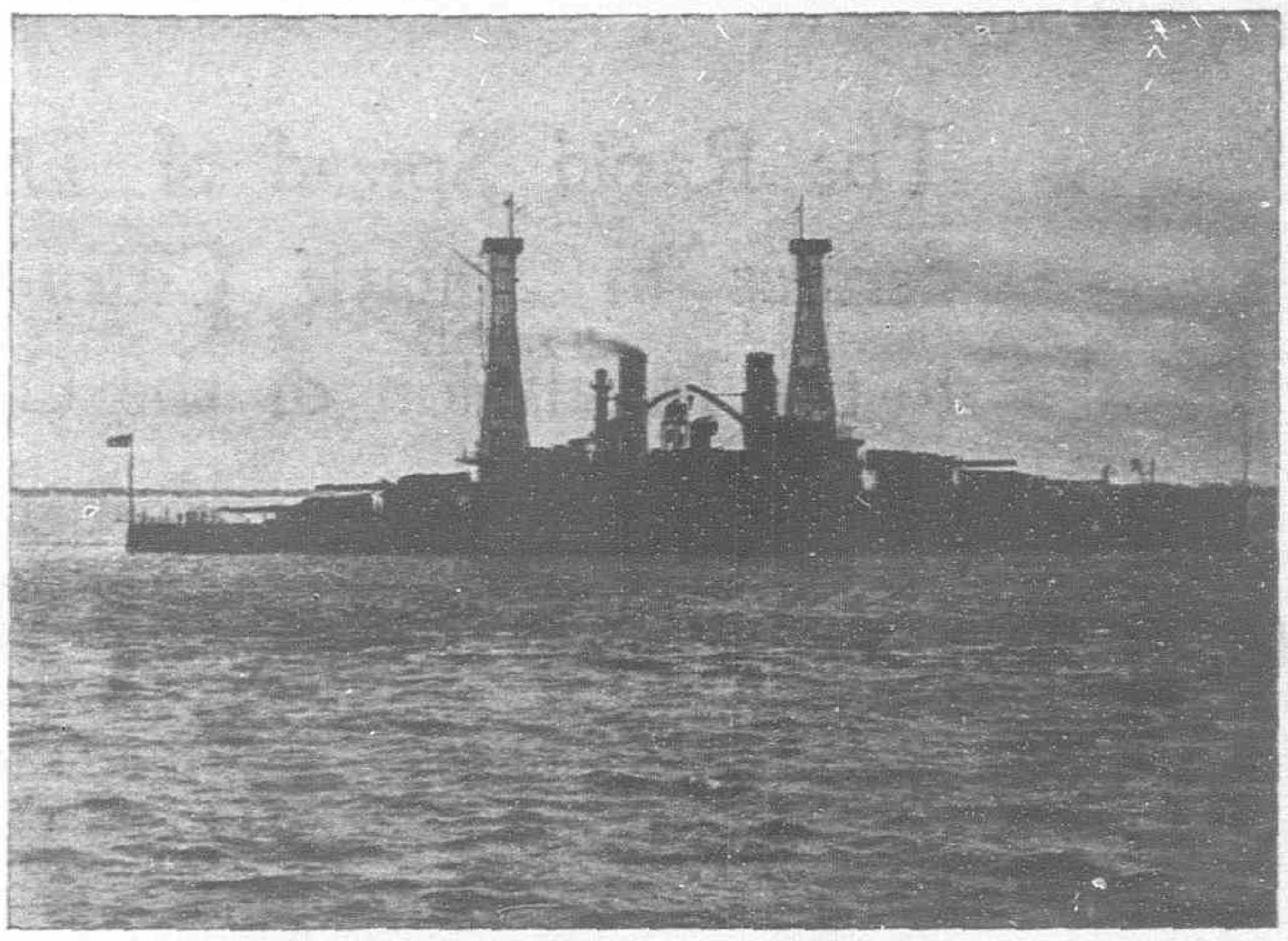

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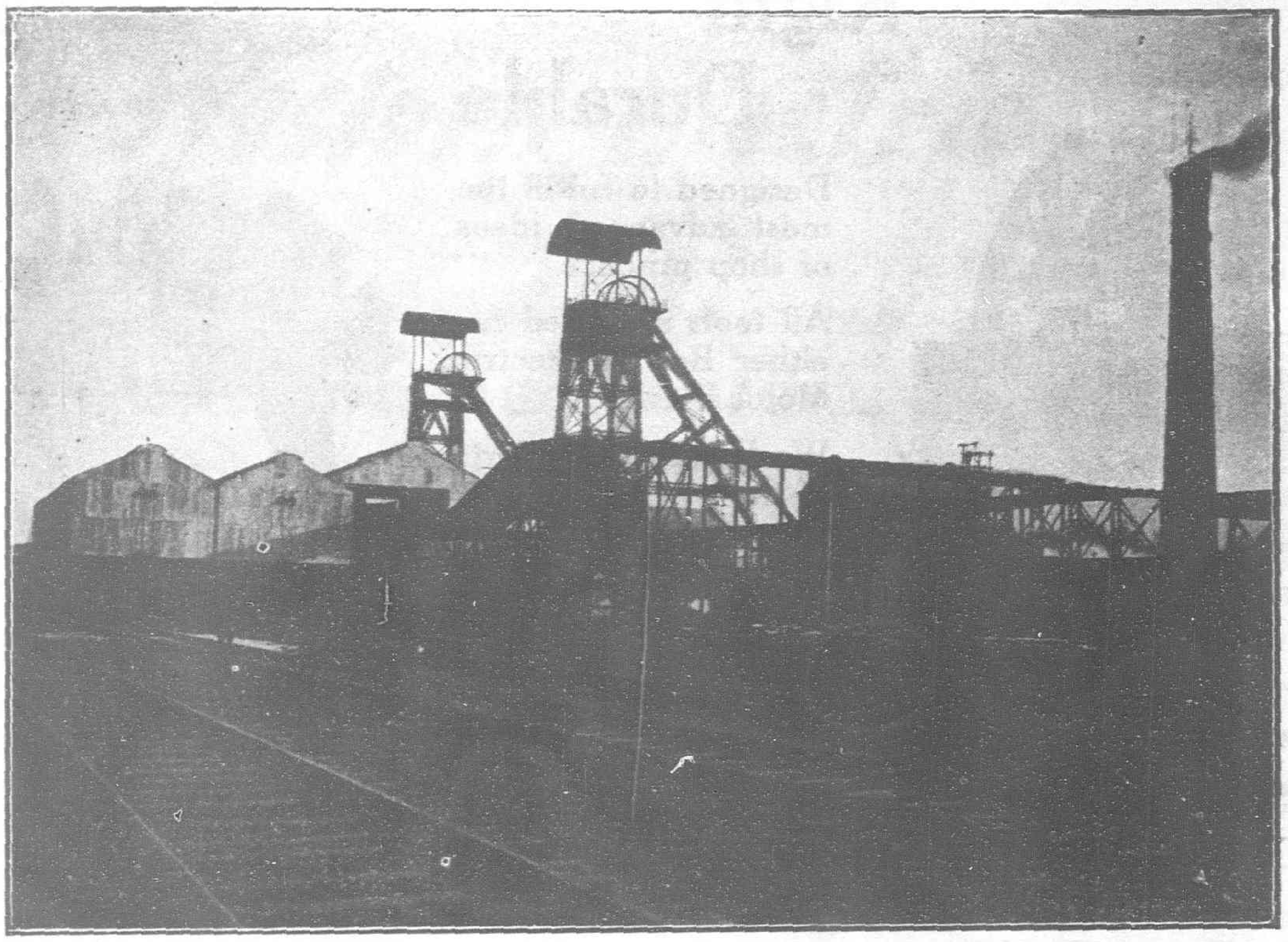

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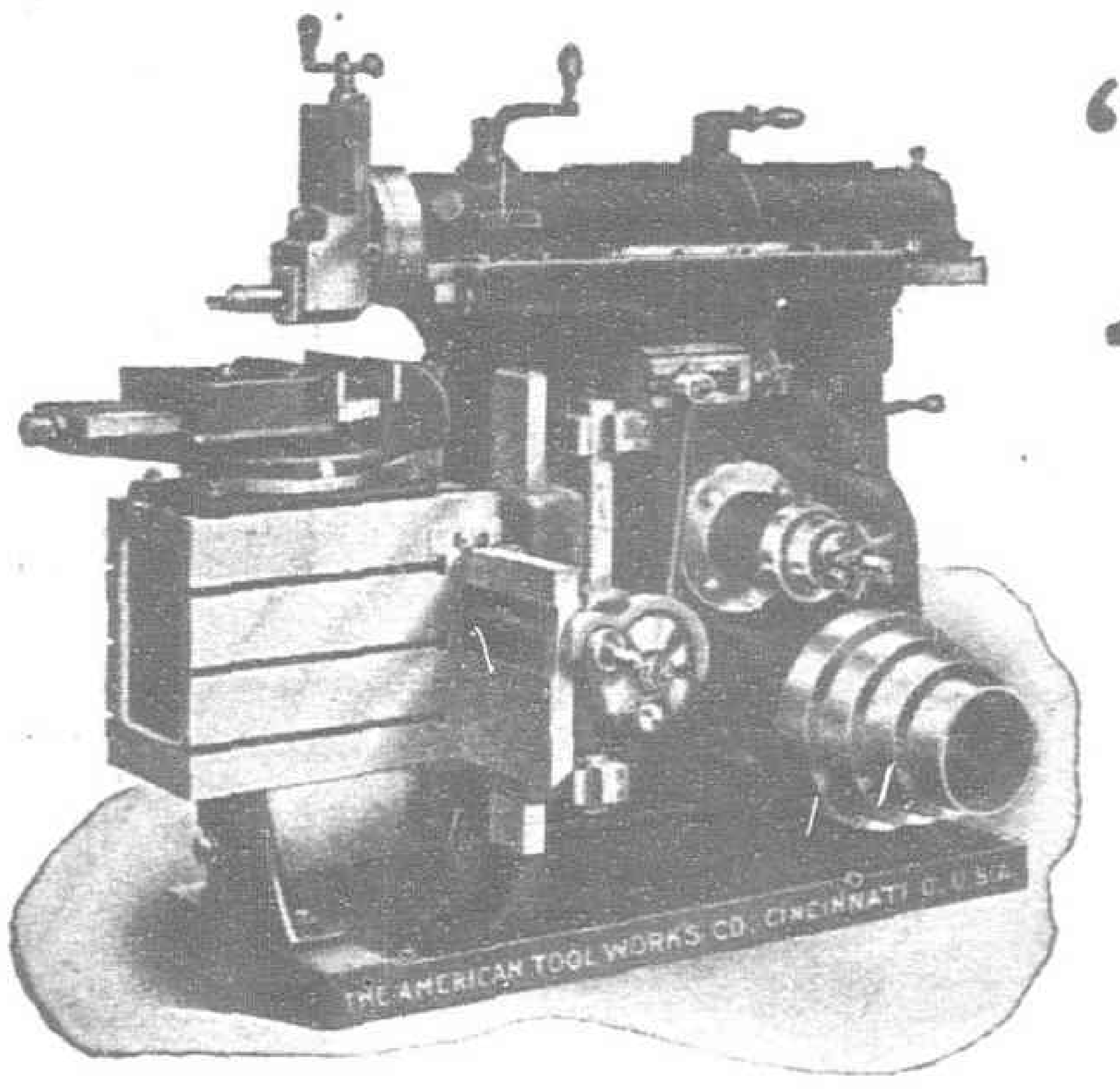

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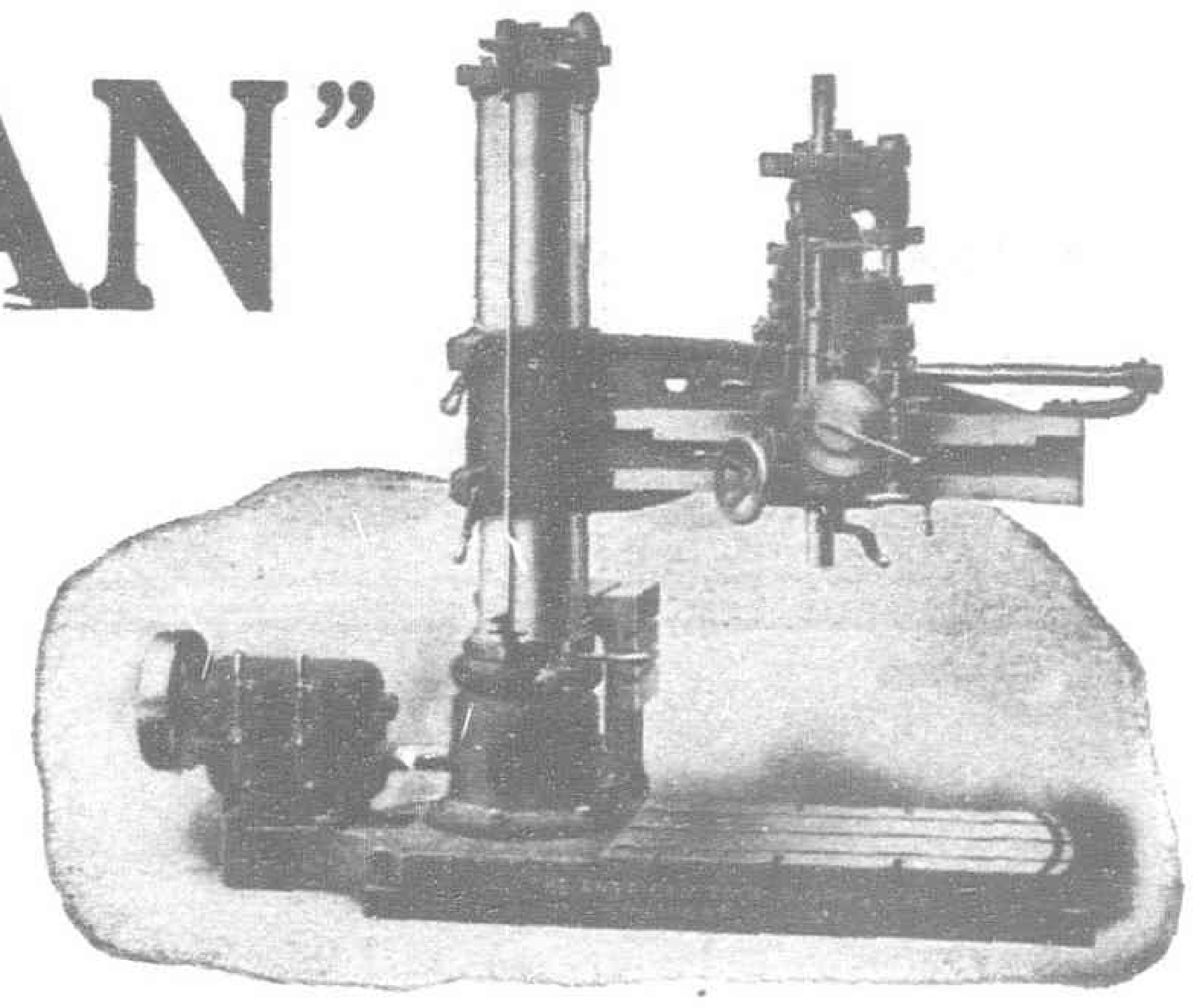

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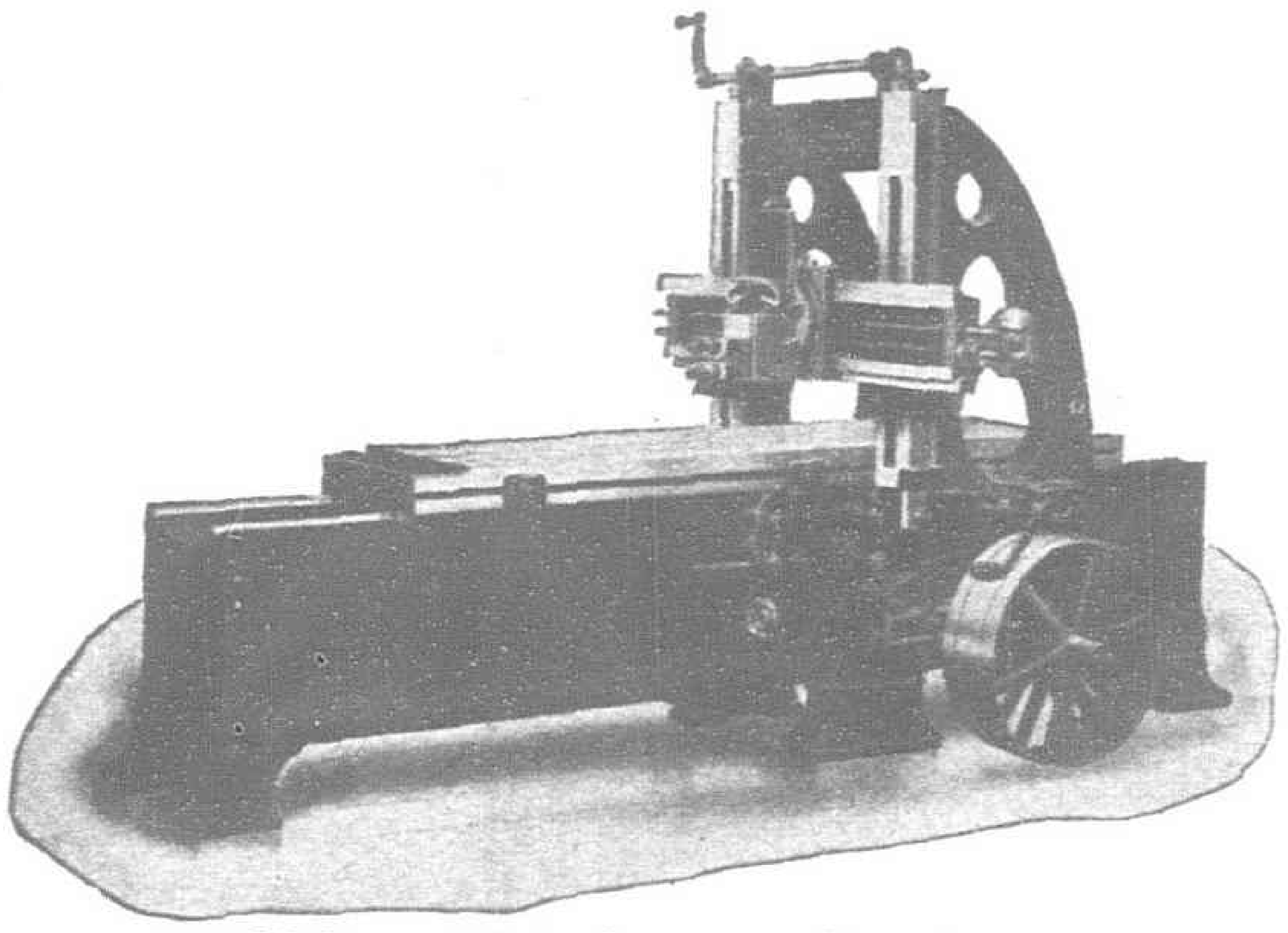

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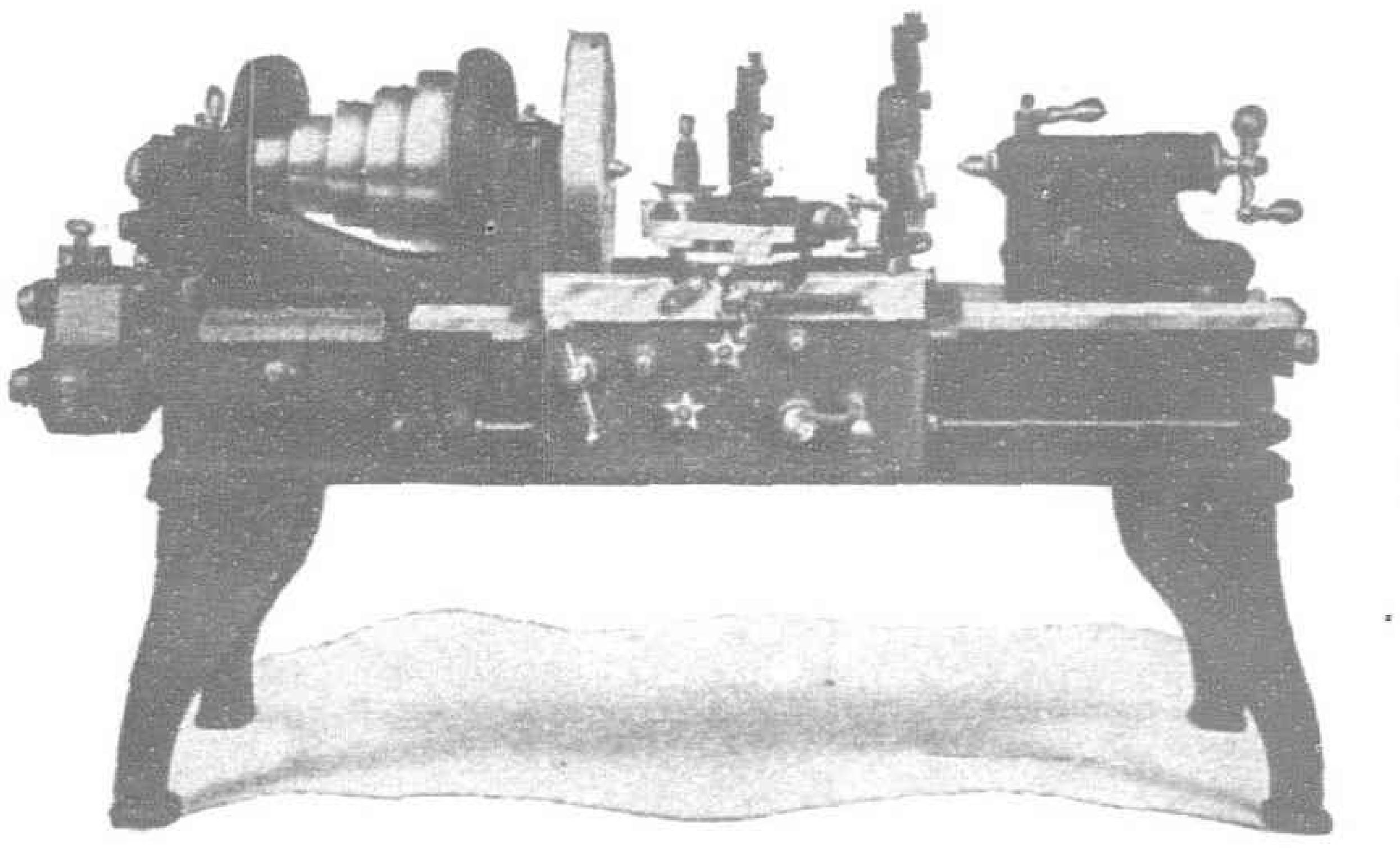

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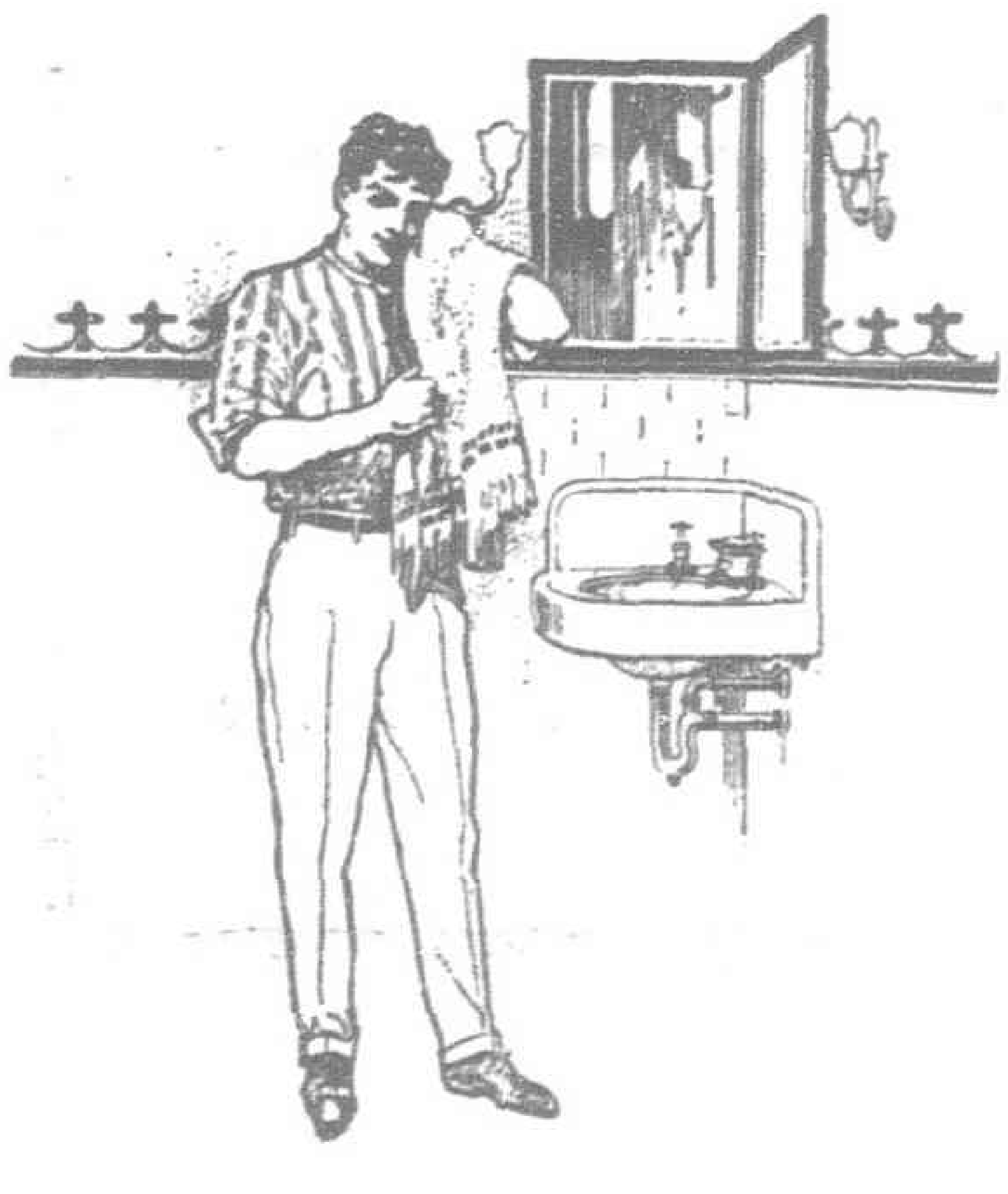

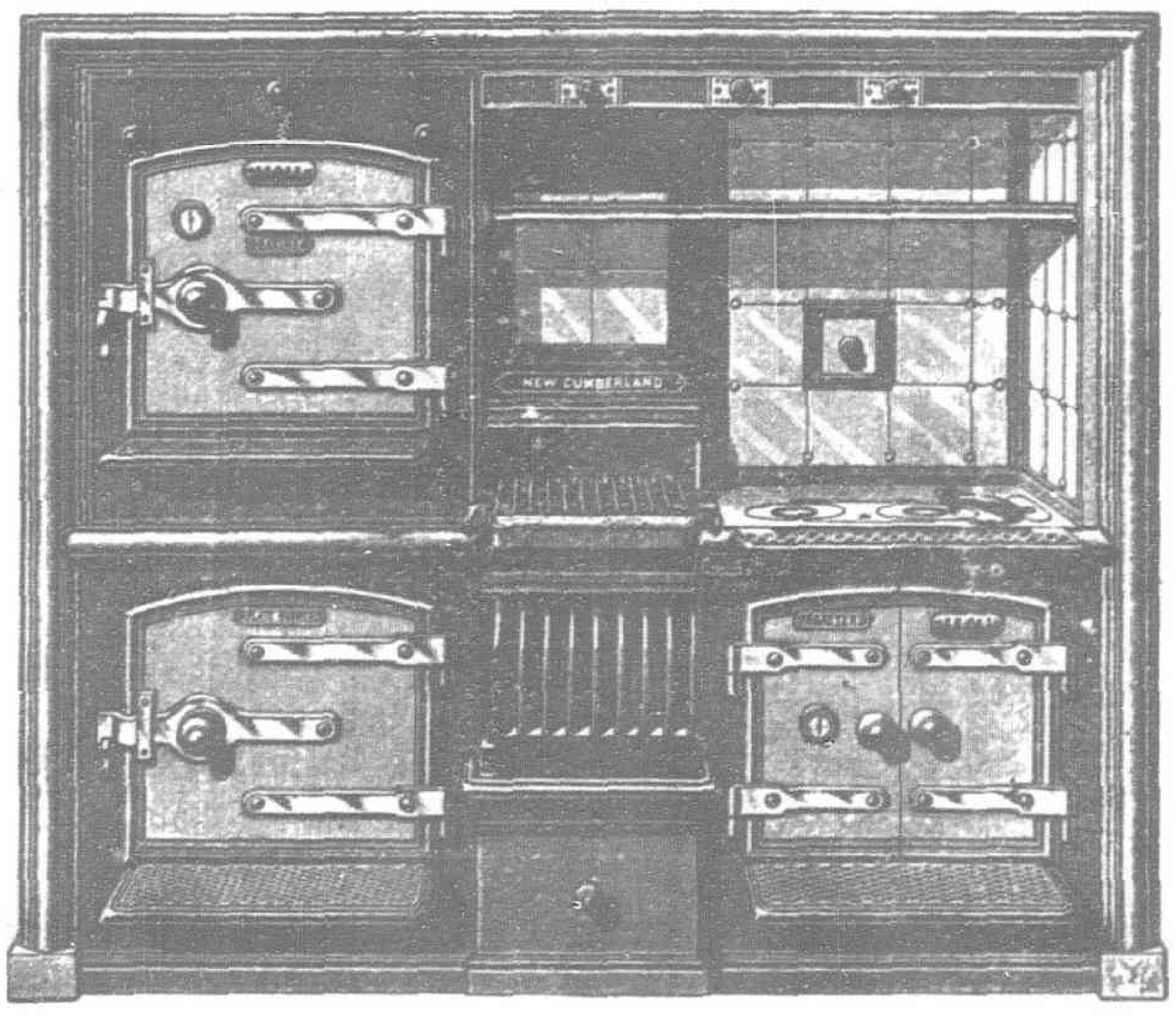

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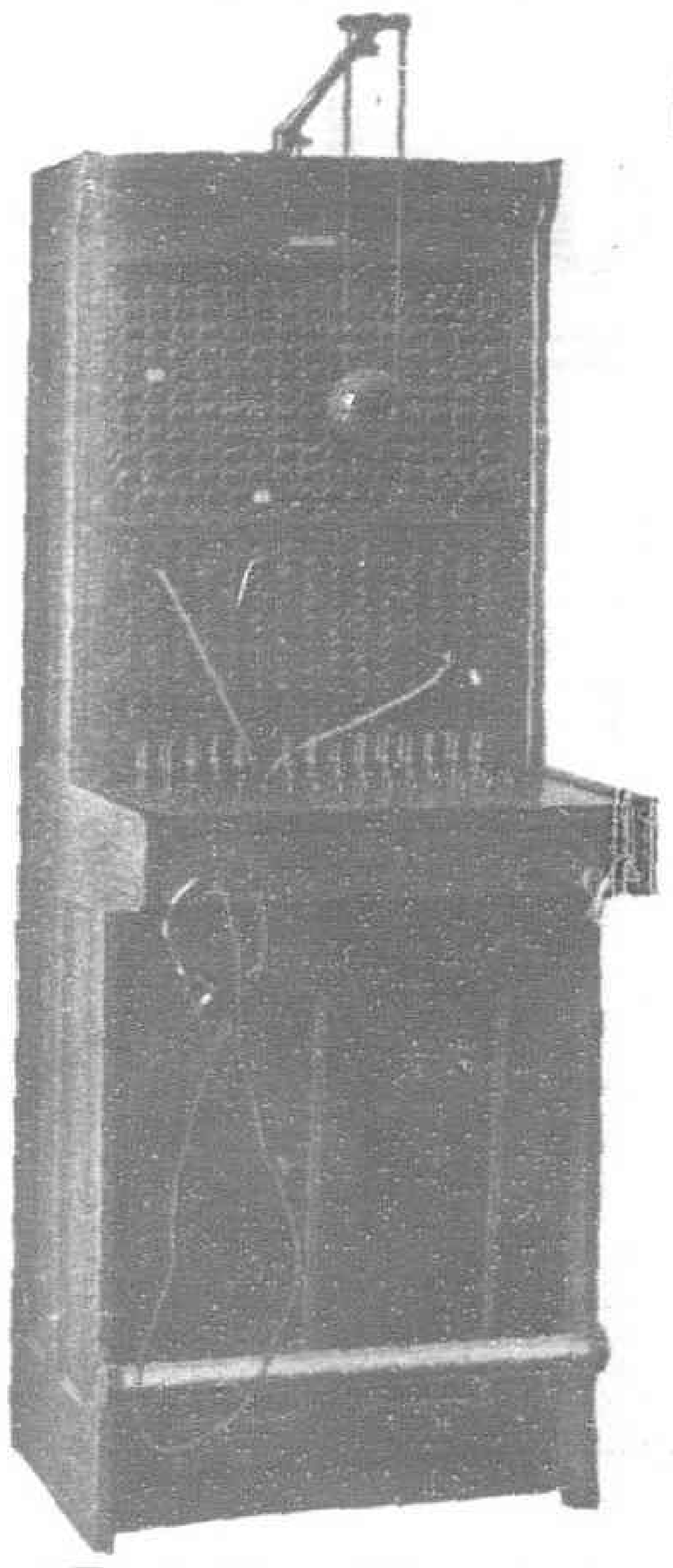

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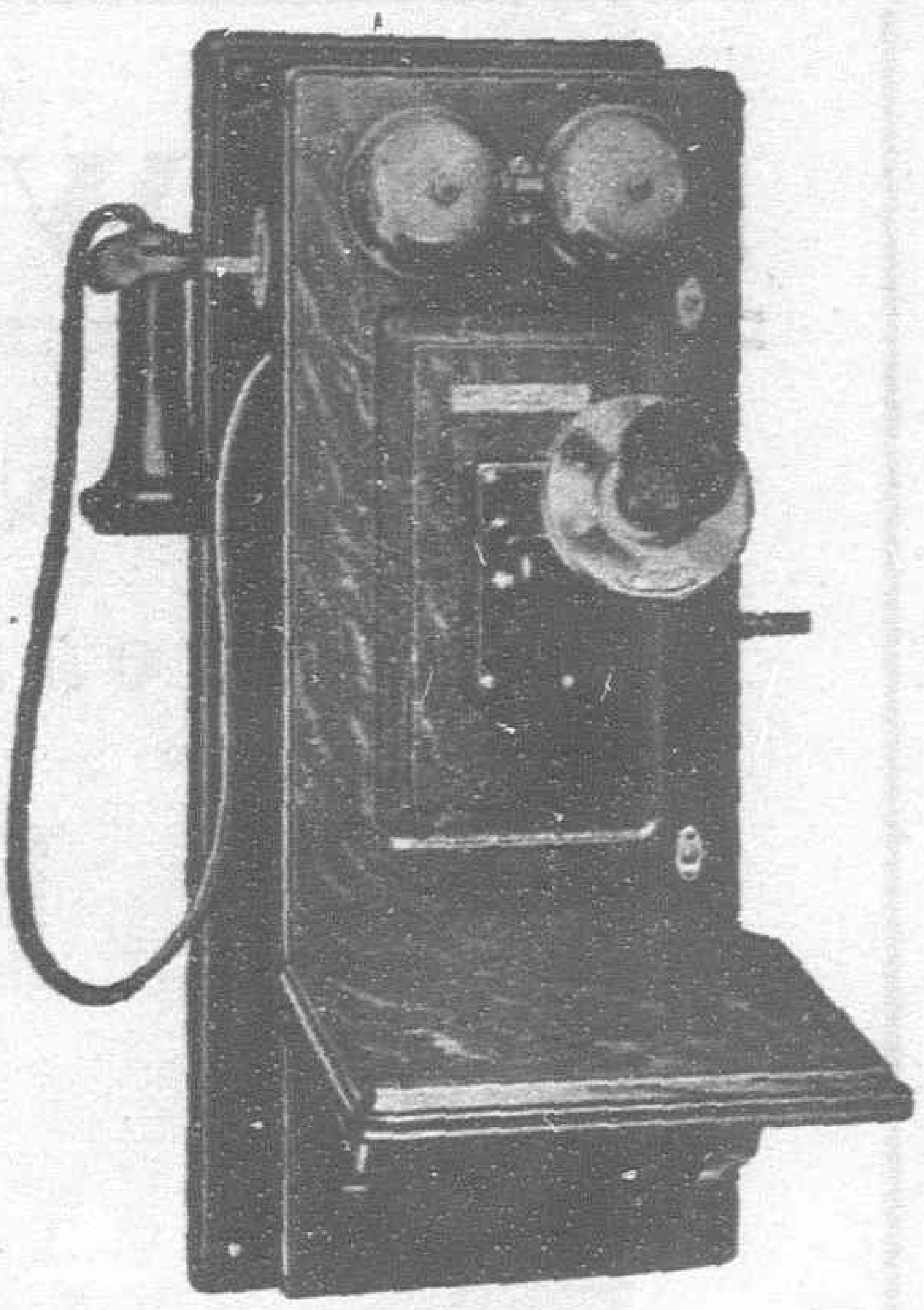

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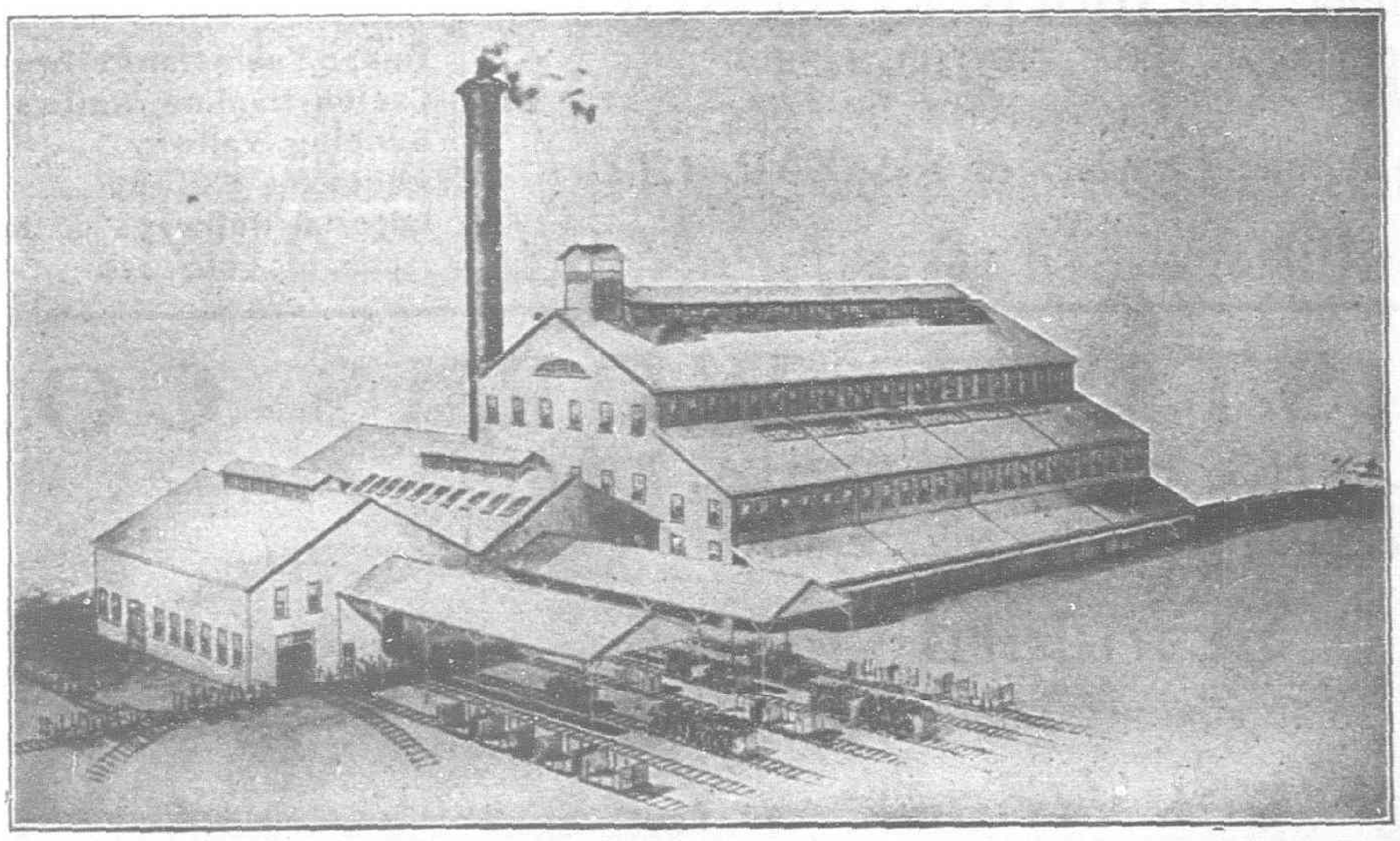

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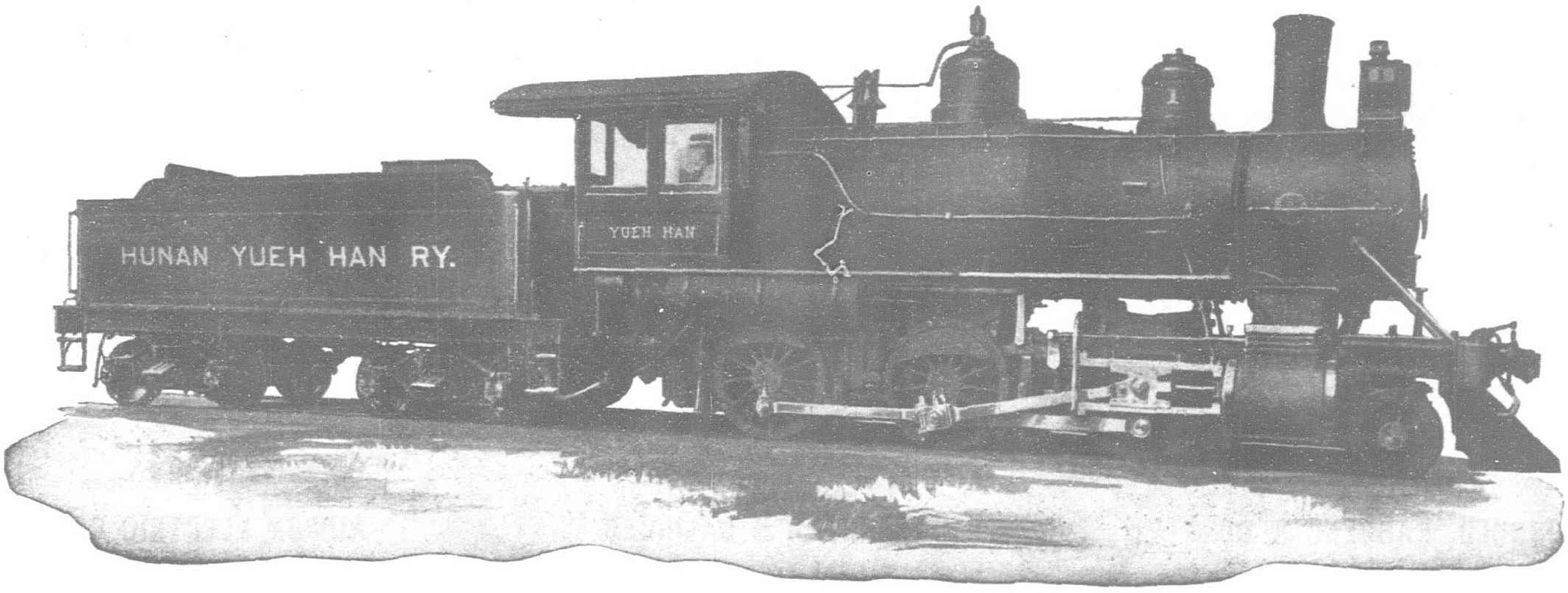

PASSENGER LOCOMOTIVE FOR THE YUEH HAN RAILWAY

ELECTRIC MOTOR & TRAILER TRUCKS

Baldwin Locomotives are in operation on the
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- Tientsin-Pukow Railway S. Sect.
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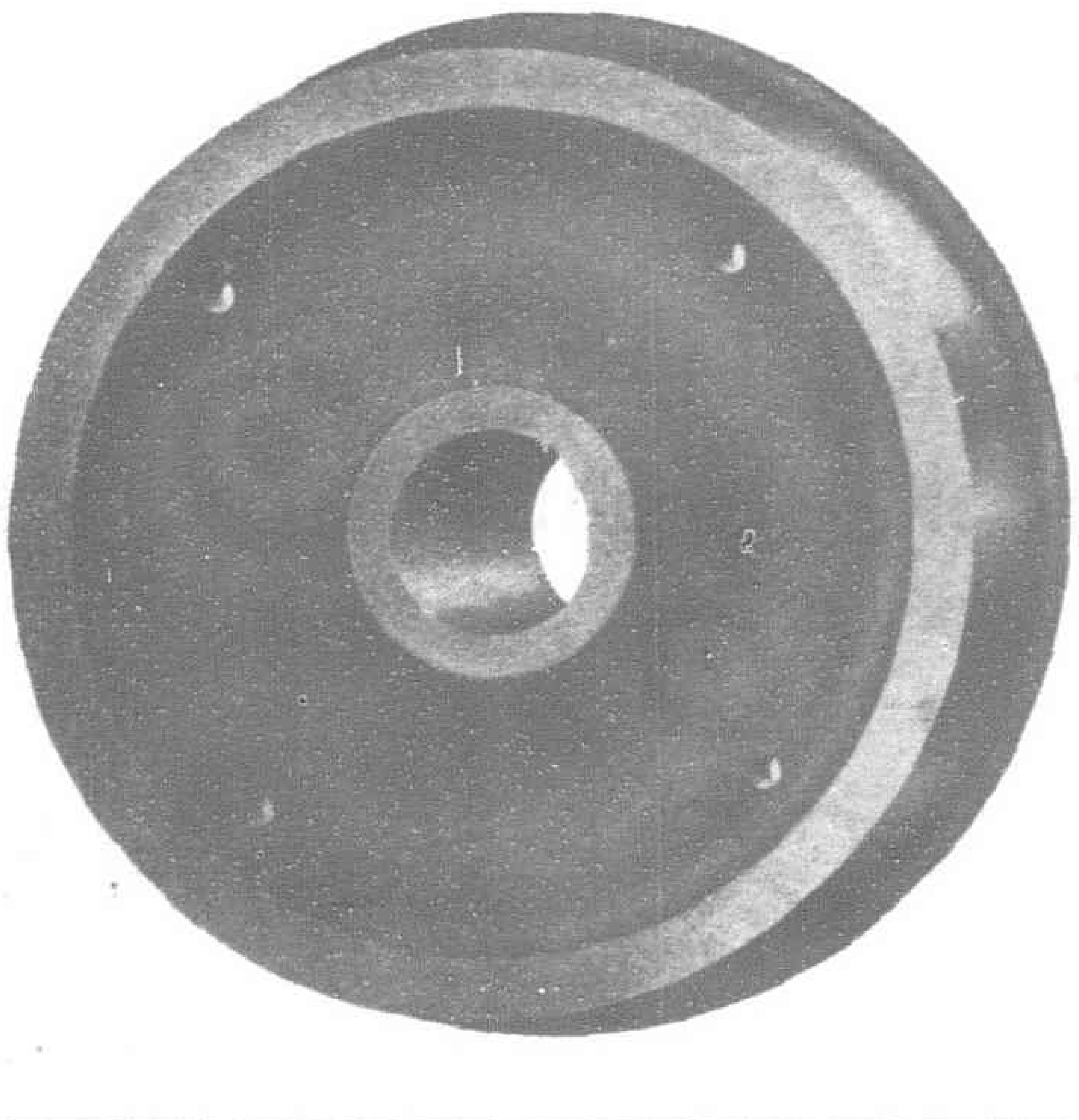

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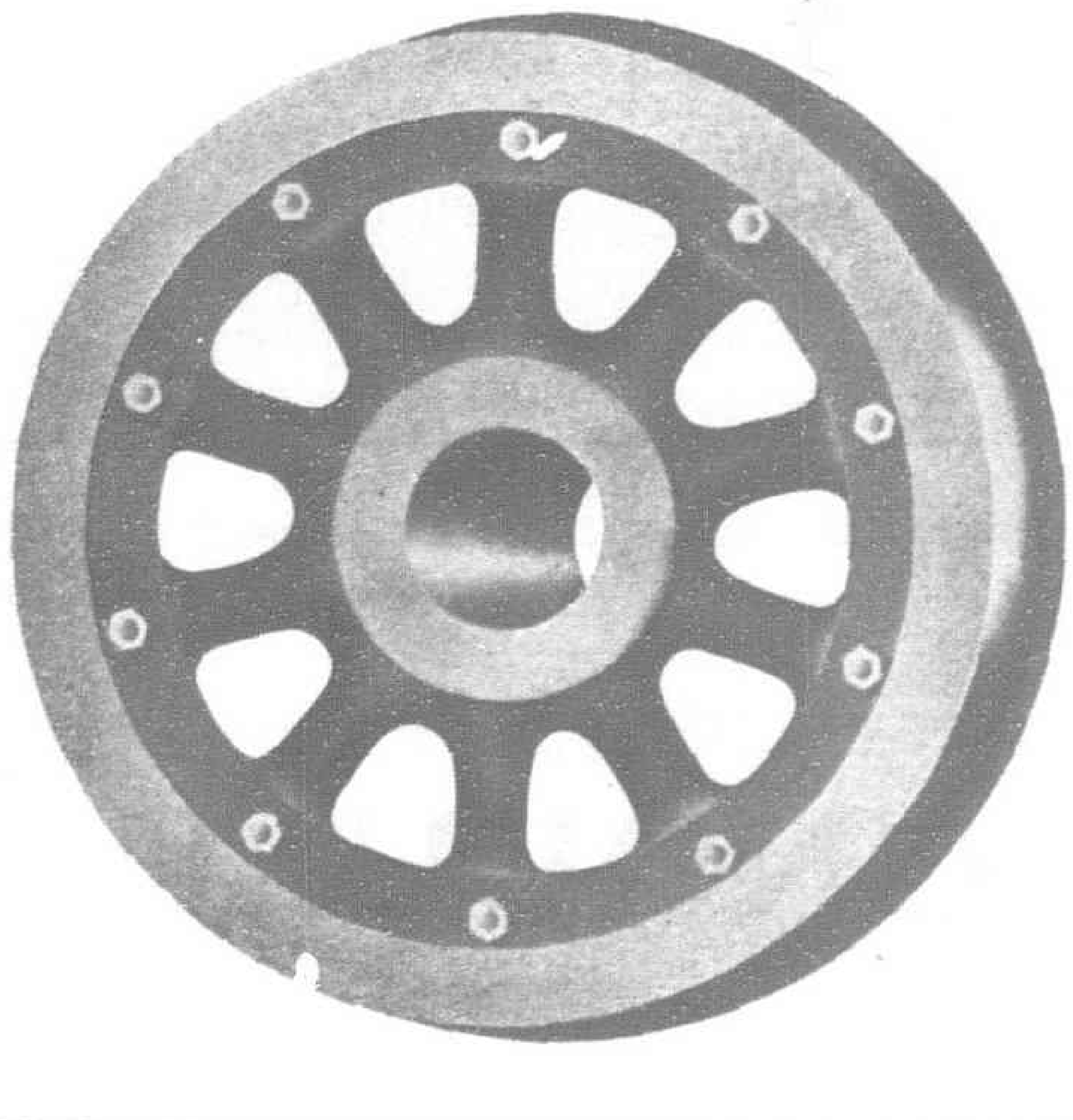

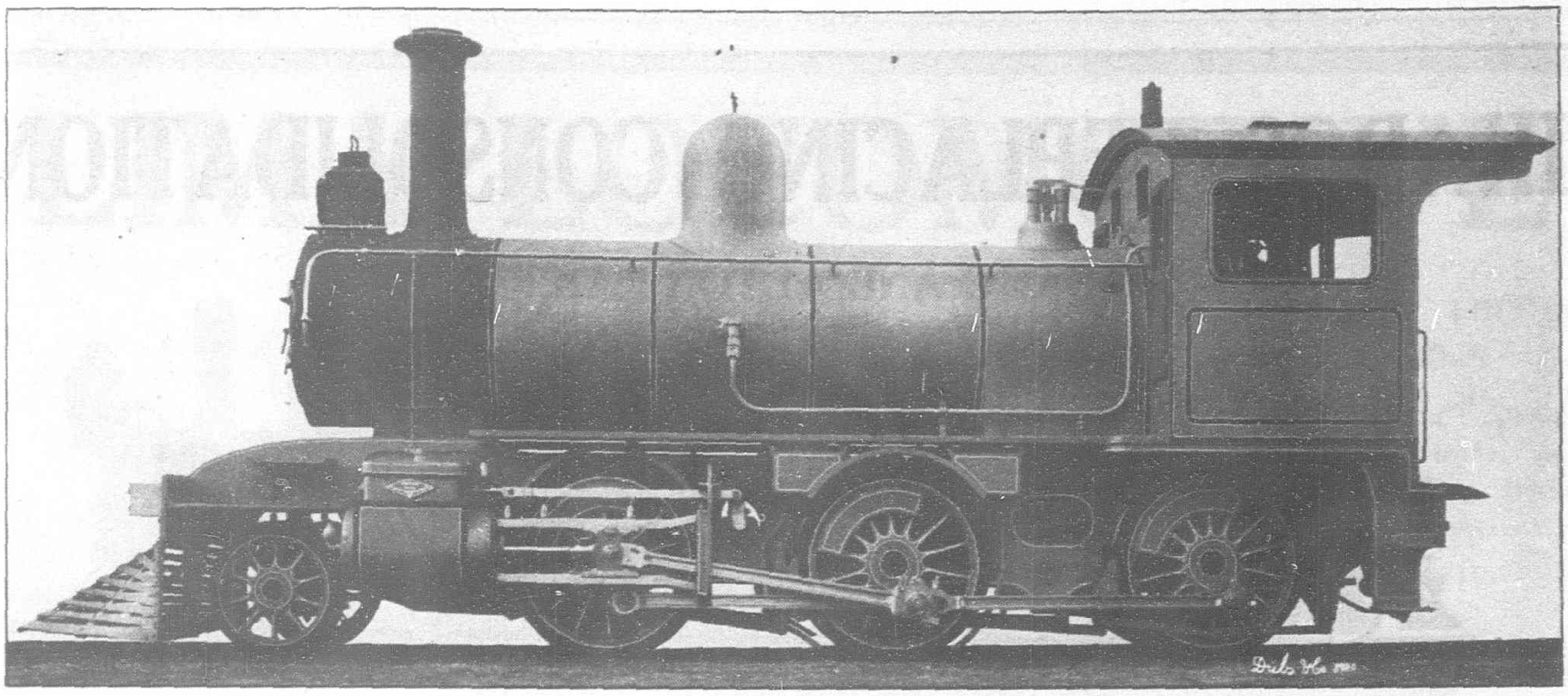

MOGUL TYPE ENGINE FOR THE IMPERIAL RAILWAY OF NORTH CHINA MADE BY THE NORTH BRITISH LOCOMOTIVE CO.

North British Locomotive Co., Ltd.

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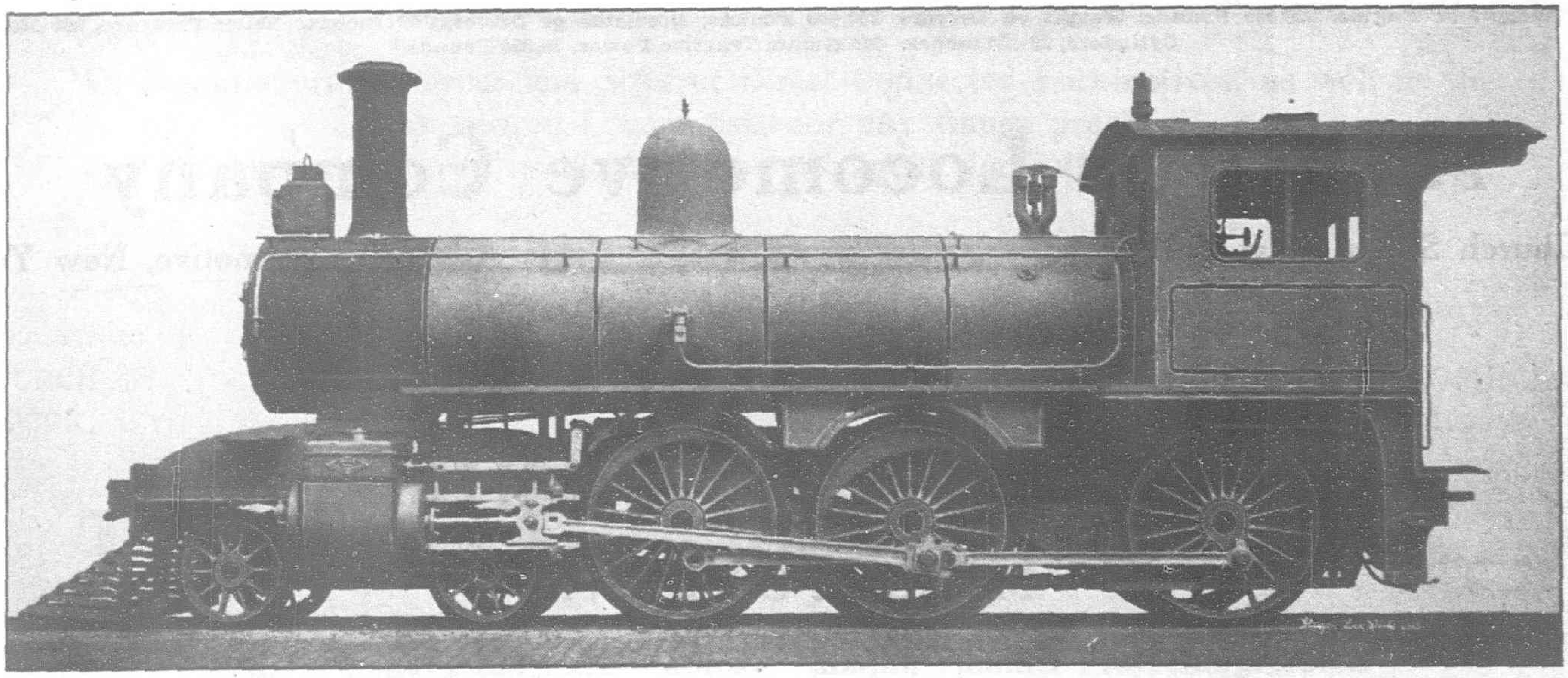
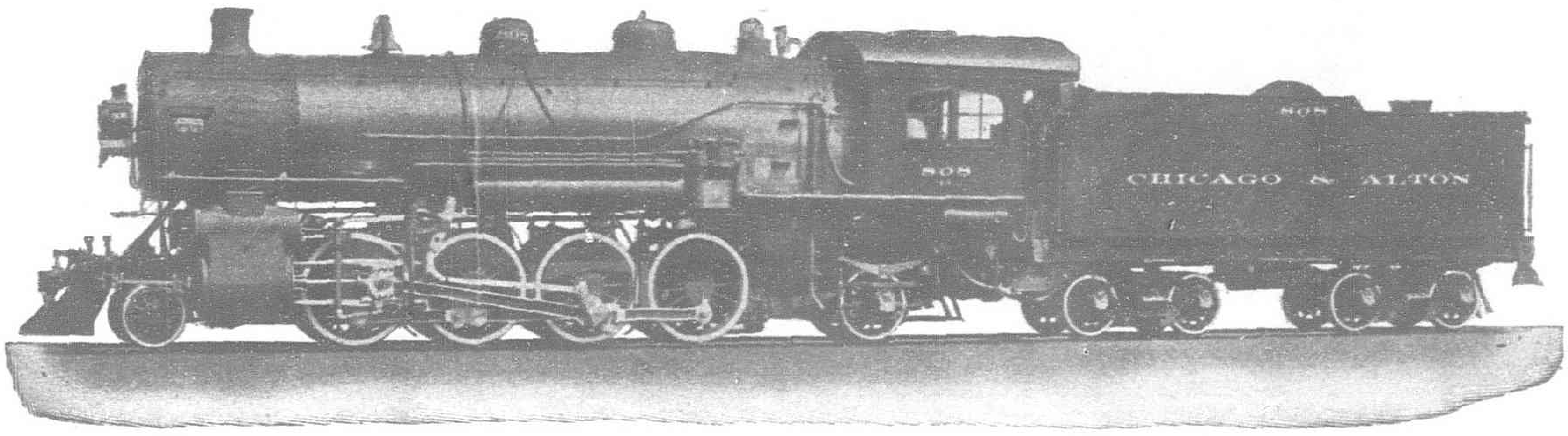


PASSENGER TYPE OF LOCOMOTIVE FOR THE I. R. OF NORTH CHINA BUILT BY THE NORTH BRITISH LOCOMOTIVE CO.

THE LARGEST LOCOMOTIVE WORKS IN EUROPE

MIKADOS REPLACING CONSOLIDATIONS

CHICAGO AND ALTON RAILROAD



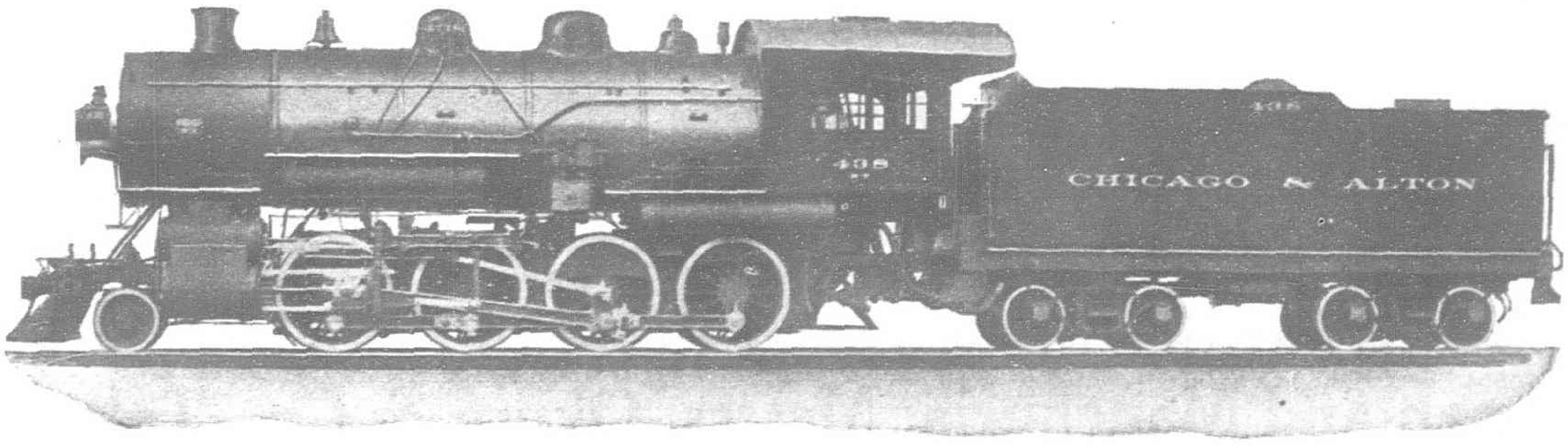
MIKADO TYPE LOCOMOTIVE
Total Weight of Engine, 269,000 Pounds. Weight on Drivers, 212,300 Pounds; Diameter of Drivers, 62 Inches. Boiler Pressure, 160 Pounds; Cylinders, 28×30 Inches. Maximum Tractive Power, 51,590 Pounds.

The heaviest freight service on the Chicago & Alton was formerly handled by Consolidation locomotives.

Desiring to reduce the cost of operation the railroad supplied specifications for Mikado type locomotives with greatly increased power and capacity. The locomotives were designed in accordance with these specifications, including the use of superheaters.

These Mikado type locomotives are handling trains of 4,000 tons as against 3,200 tons for the Consolidations, and are saving 28 per cent. in coal. Owing to the increase in tonnage four trains with Mikado engines are equal to five with Consolidations, showing a reduction of one-fifth, or 20 per cent., in the number of trains over the divisions from Virden to Bloomington and Bloomington to Chicago. There is a grade of three-tenths of one per cent. for five miles on the Bloomington to Chicago division and .85 of one per cent. on the Bloomington to Virden division, where a Mallet is used as helper.

You may have possibilities for effecting savings.



CONSOLIDATION TYPE LOCOMOTIVE
Total Weight of Engine, 228,000 Pounds; Weight on Drivers, 203,500 Pounds; Diameter of Drivers, 62 Inches. Boiler Pressure, 200 Pounds Cylinders, 22×30 inches. Maximum Tractive Power, 39,800 Pounds

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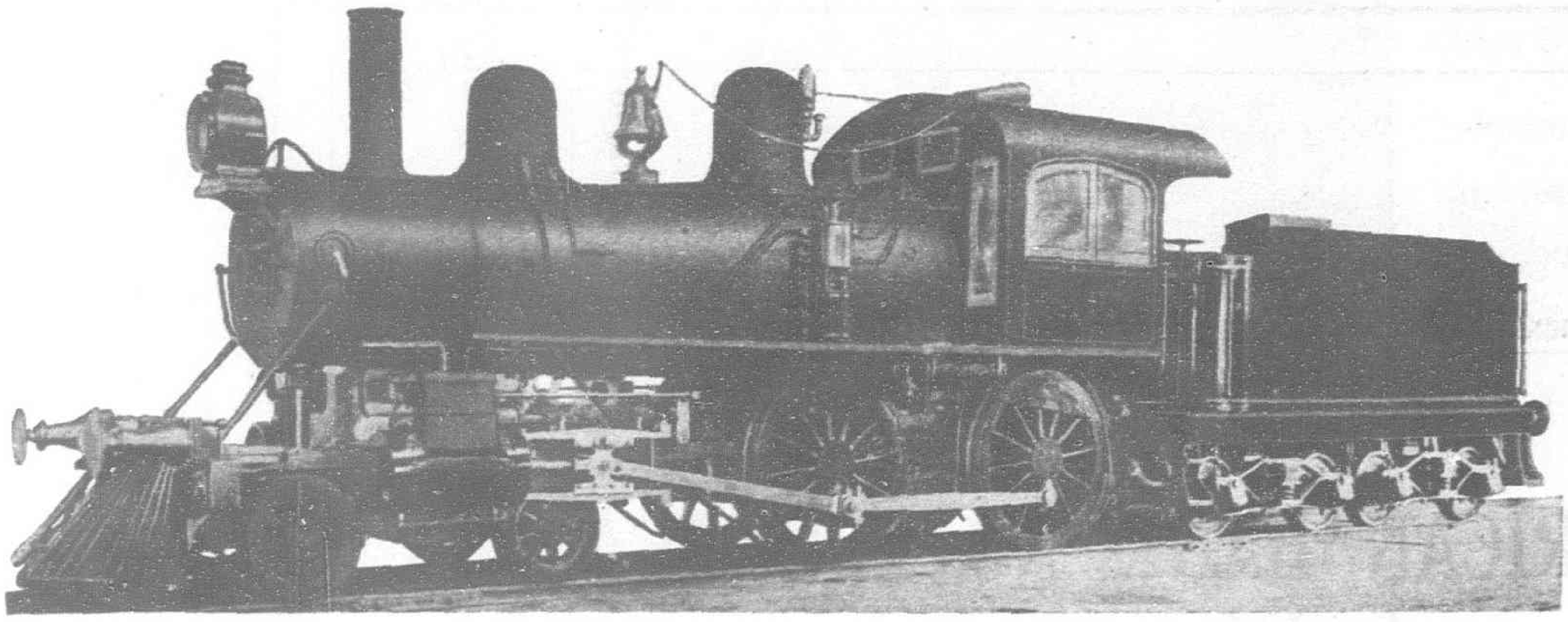

EIGHT WHEEL LOCOMOTIVE
4-4-0-8

Cylinders 15″×24″, weight on drivers 58000 pounds, 49¾″ Extended Wagon Top Boiler, 180 pounds working pressure.
Tractive power 13770 lbs.

Built for
SENOR PEDRO ROSSELOT,
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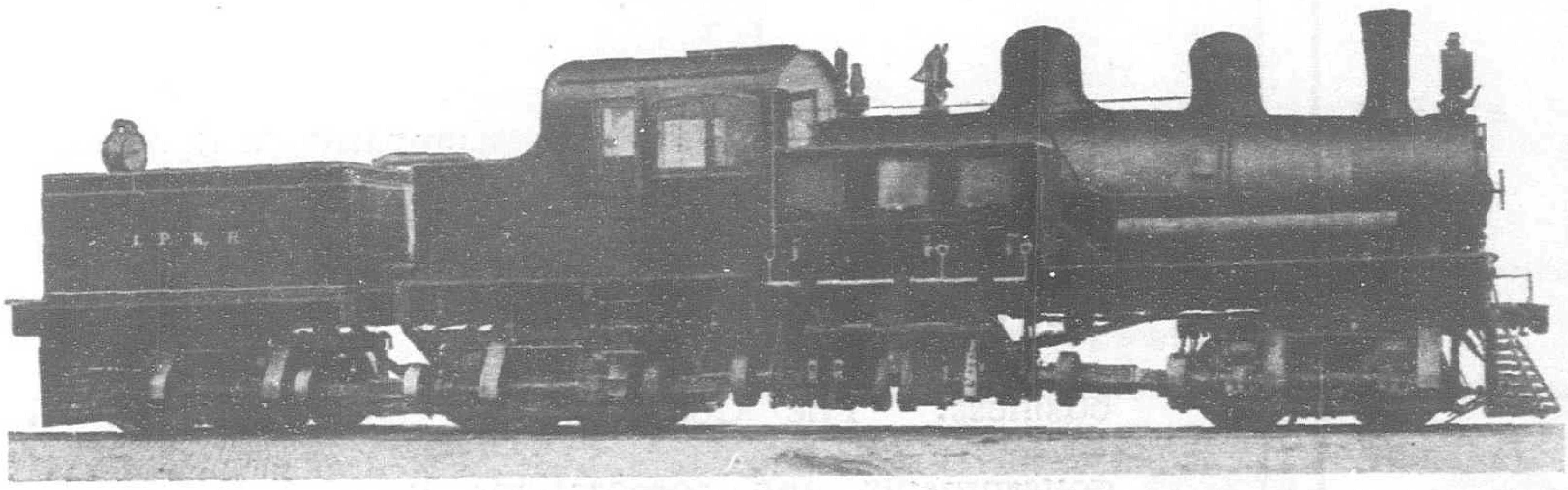
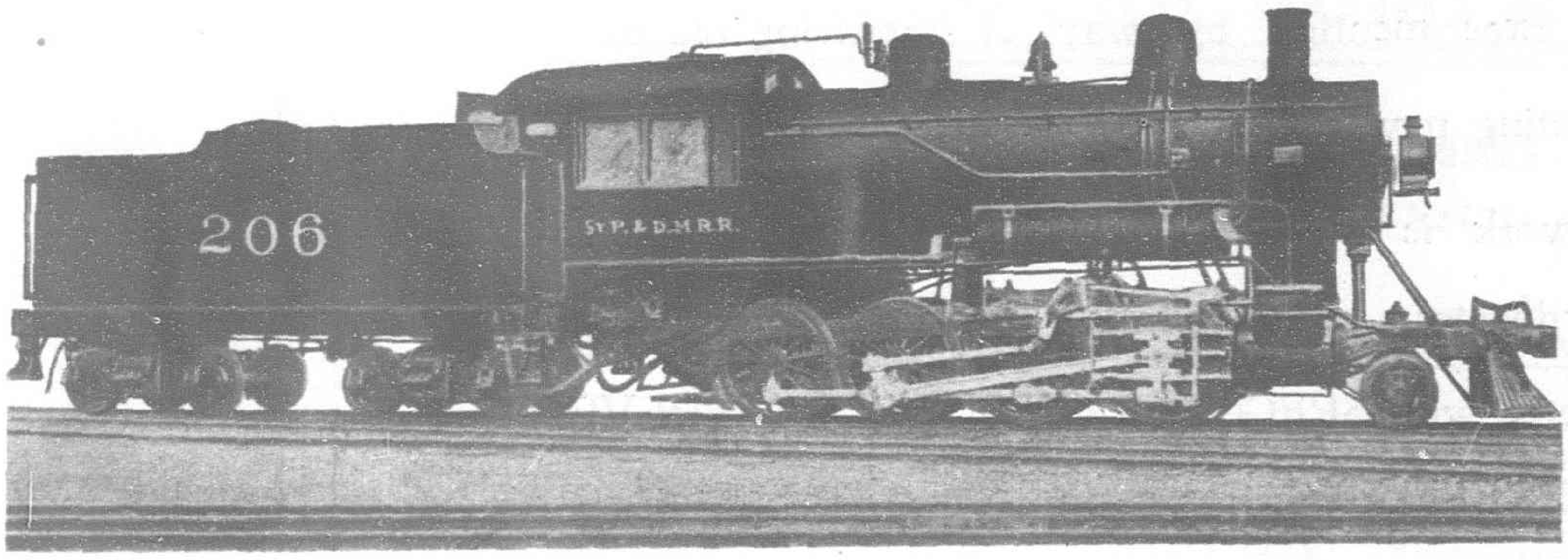
SHAY GEARED LOCOMOTIVE
100 Ton.

Cylinders 3-15″×17″, 60⅜″ Extended Wagon Top Boiler, 200 pounds working pressure.
Tractive power 44100 lbs.

Built for
IMPERIAL PEKING KALGAN RAILWAY,
PEKING, CHINA





CONSOLIDATION LOCOMOTIVE
2-8-0-8

Cylinders 20″×28″, weight on drivers 155000 pounds, 68″ Extended Wagon Top Boiler, 200 pounds working pressure.
Tractive Power 34000 lbs.

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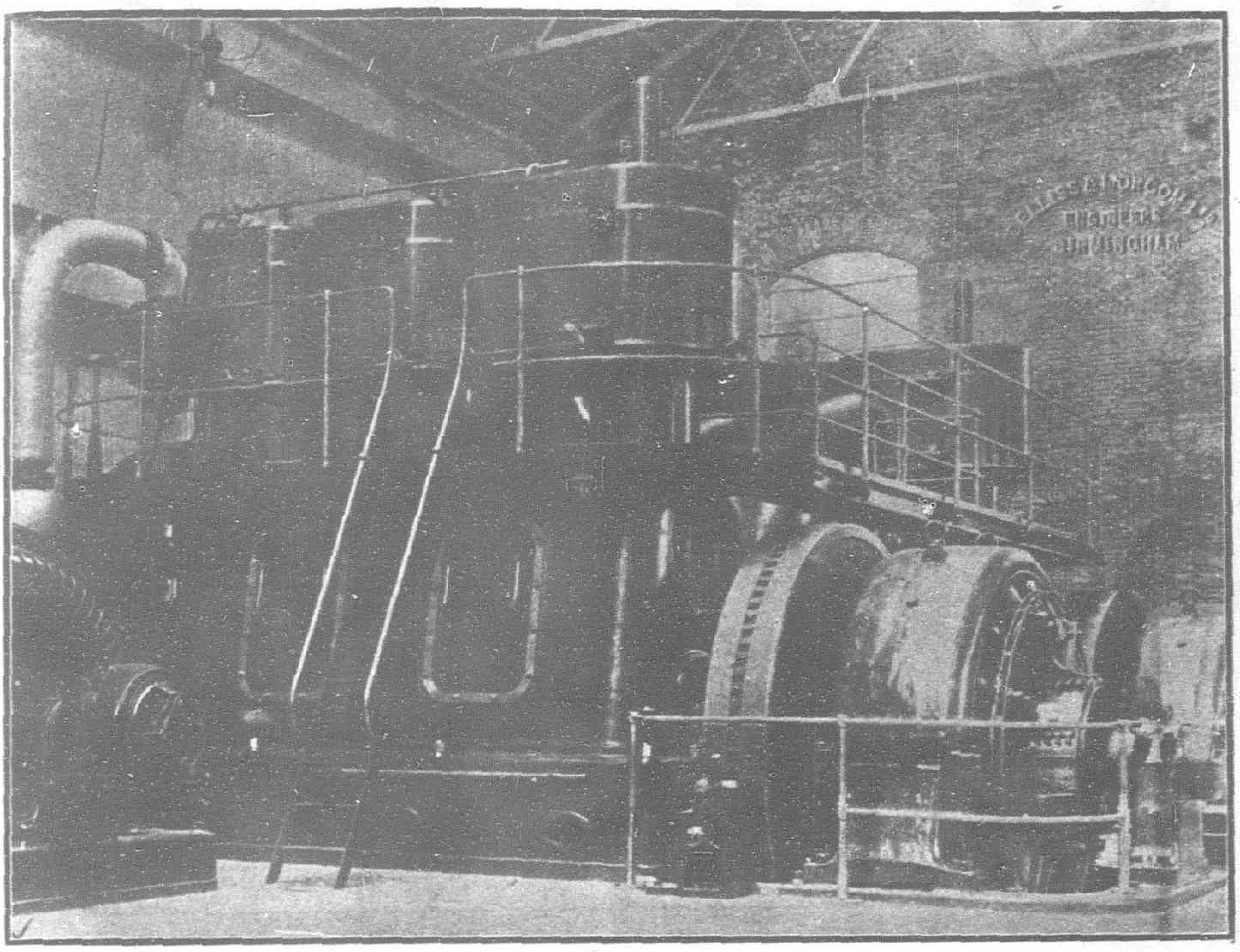

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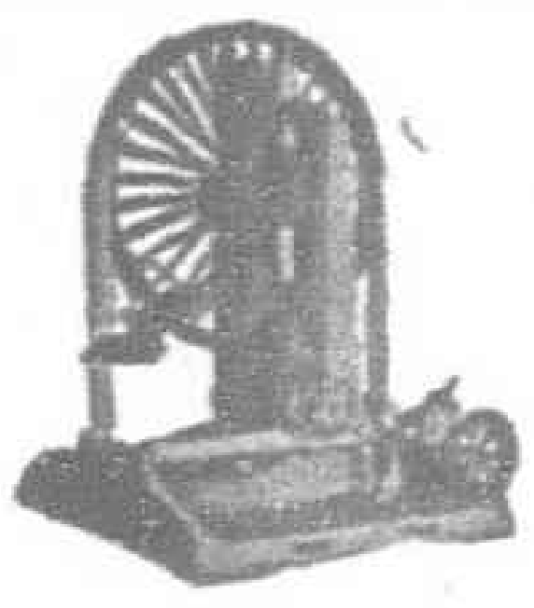

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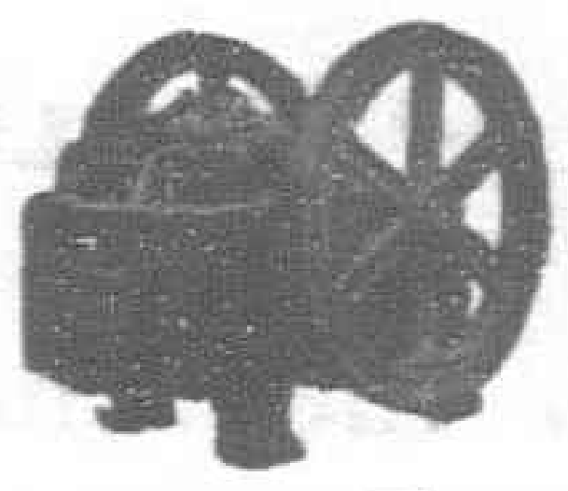
ALLIS-CHALMERS COMPANY



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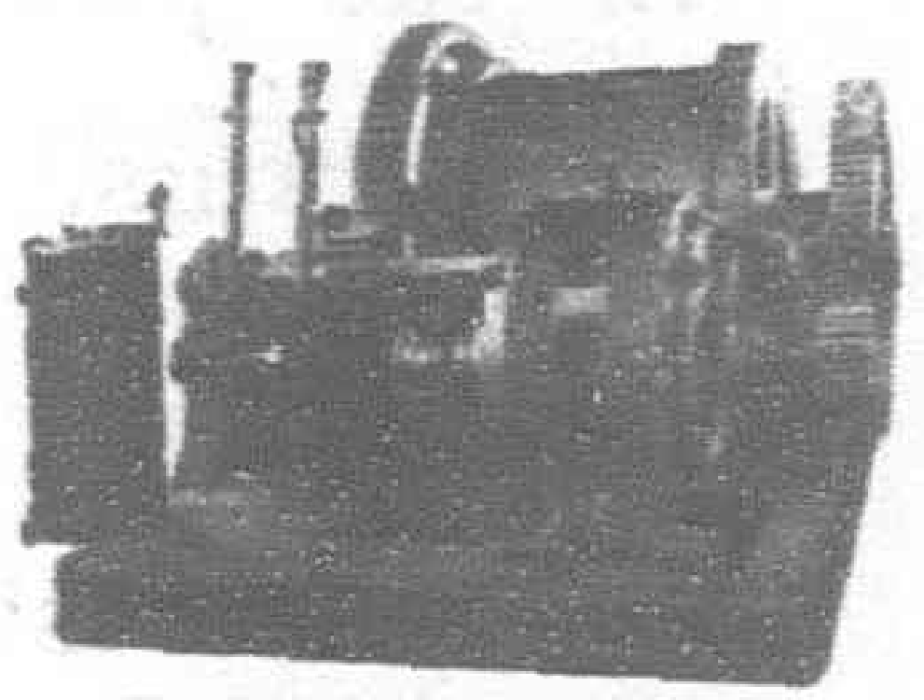
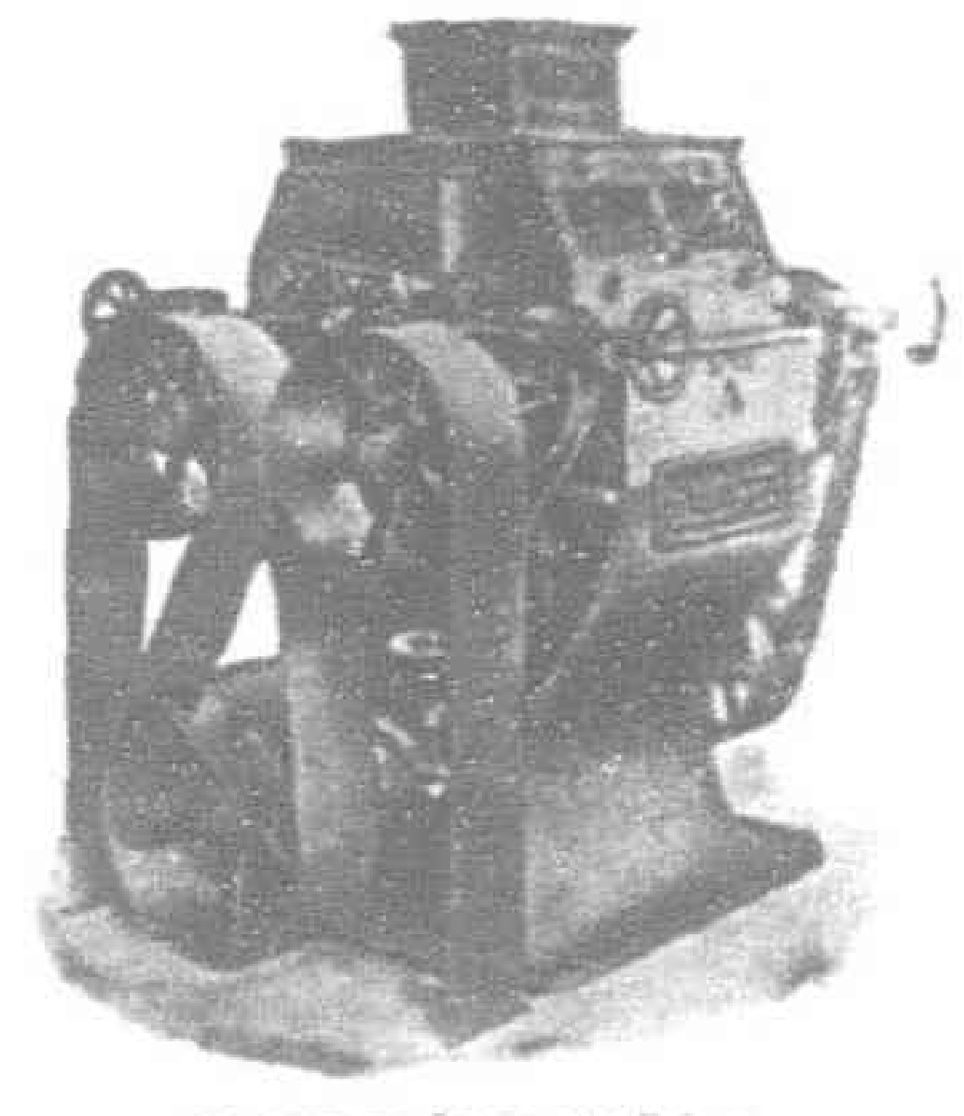


ELECTRIC HOIST



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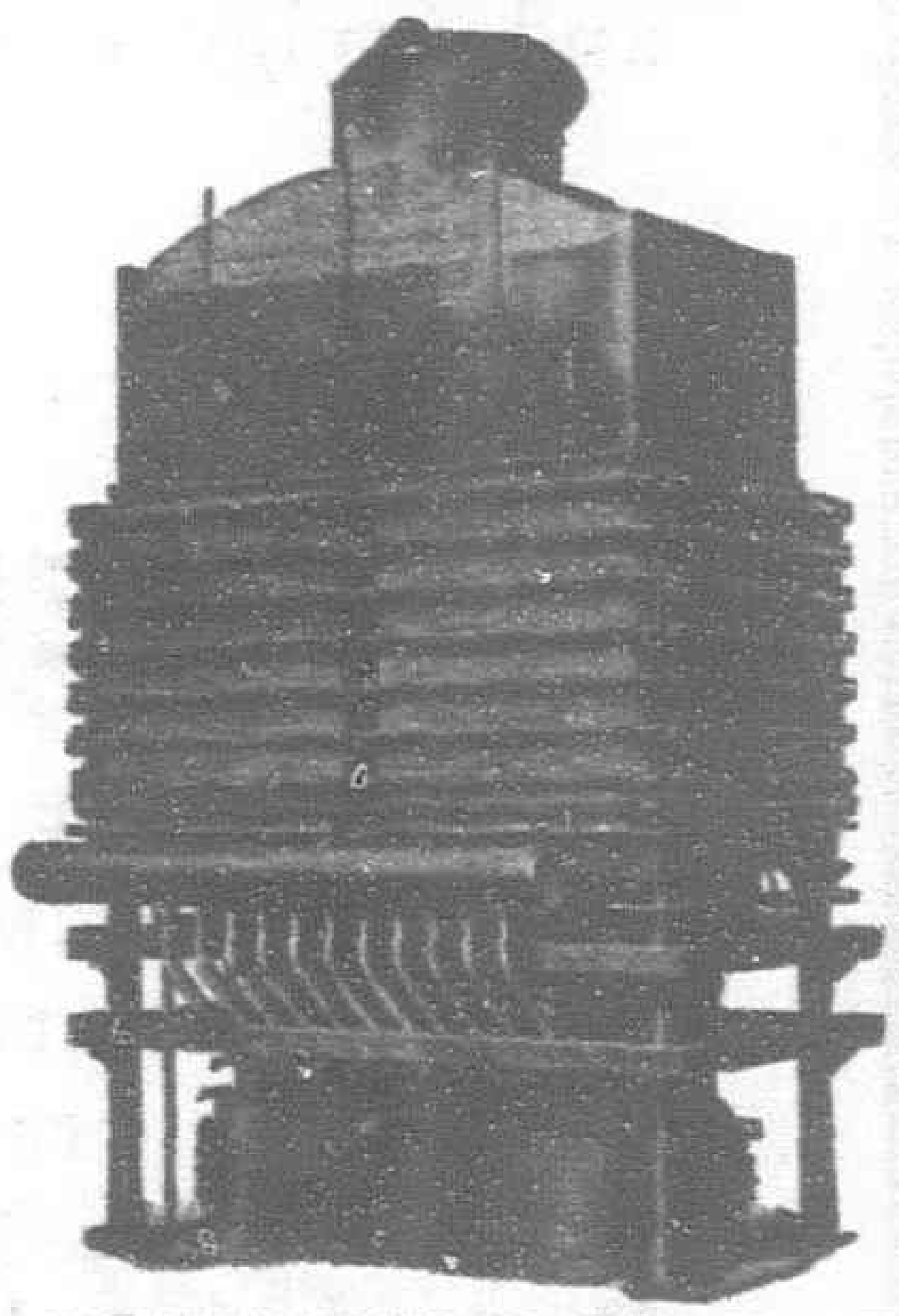
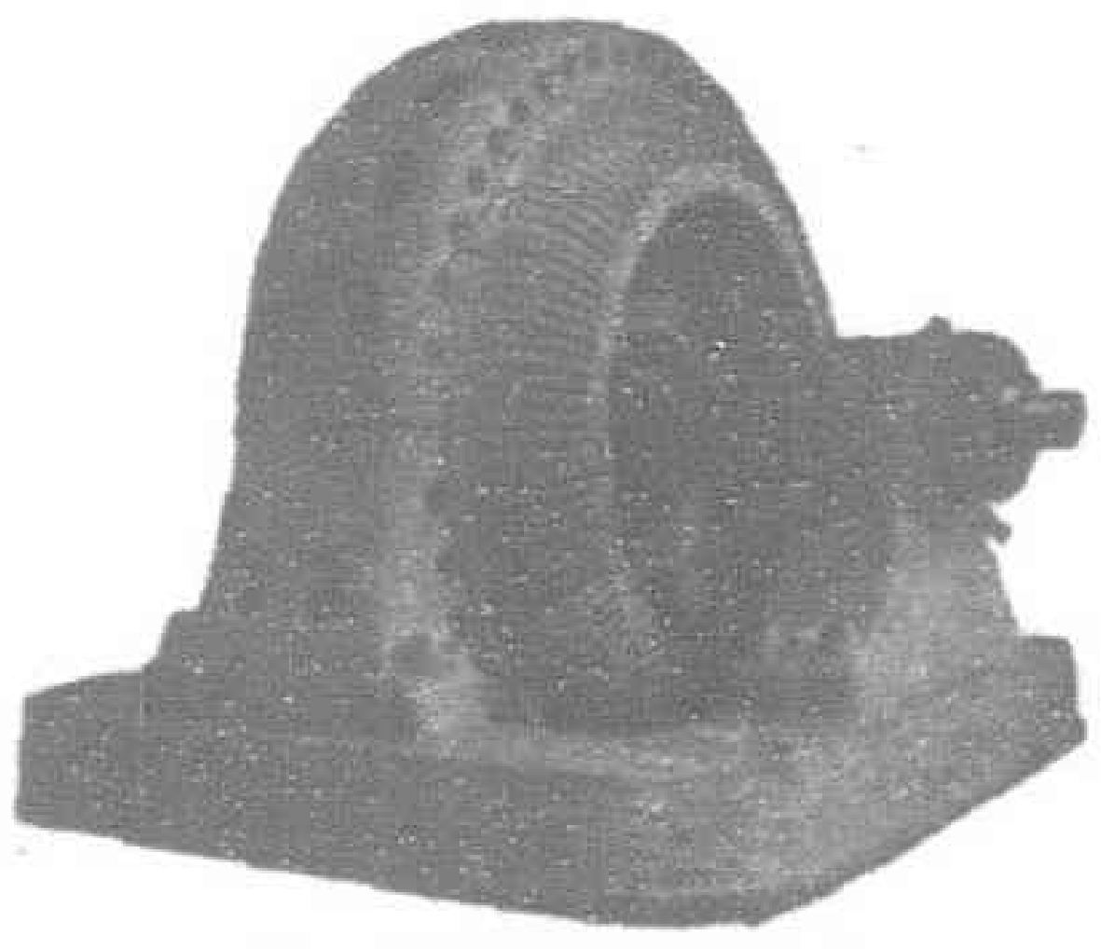
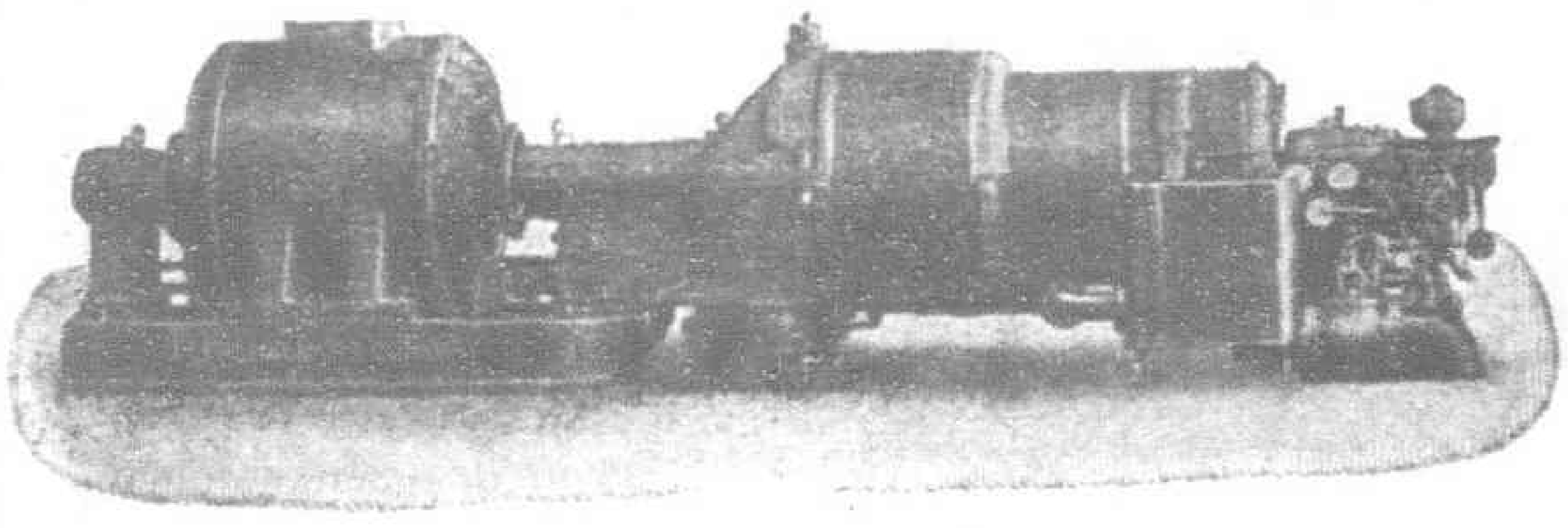


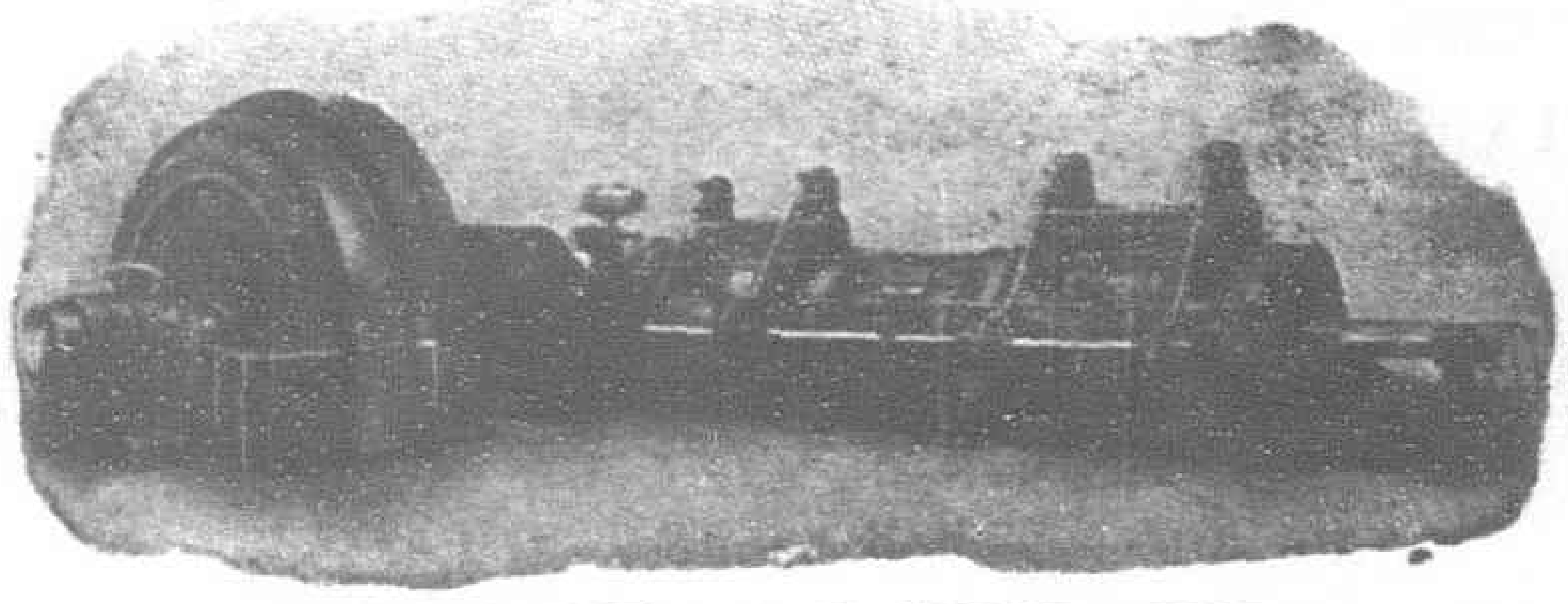
RECTANGULAR FURNACE



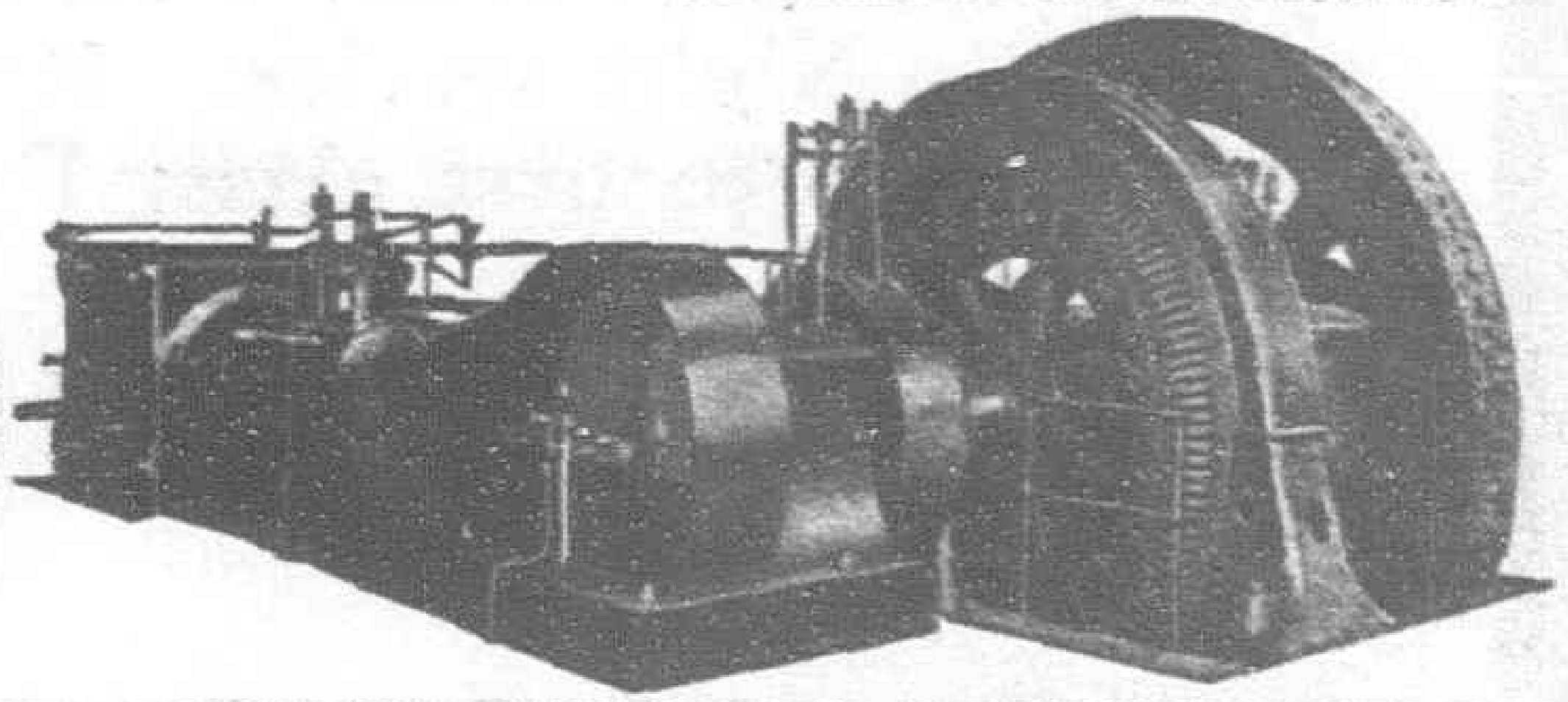
A. C. GENERATOR



STEAM TURBINE UNIT



GAS ENGINE & A. C. GENERATOR



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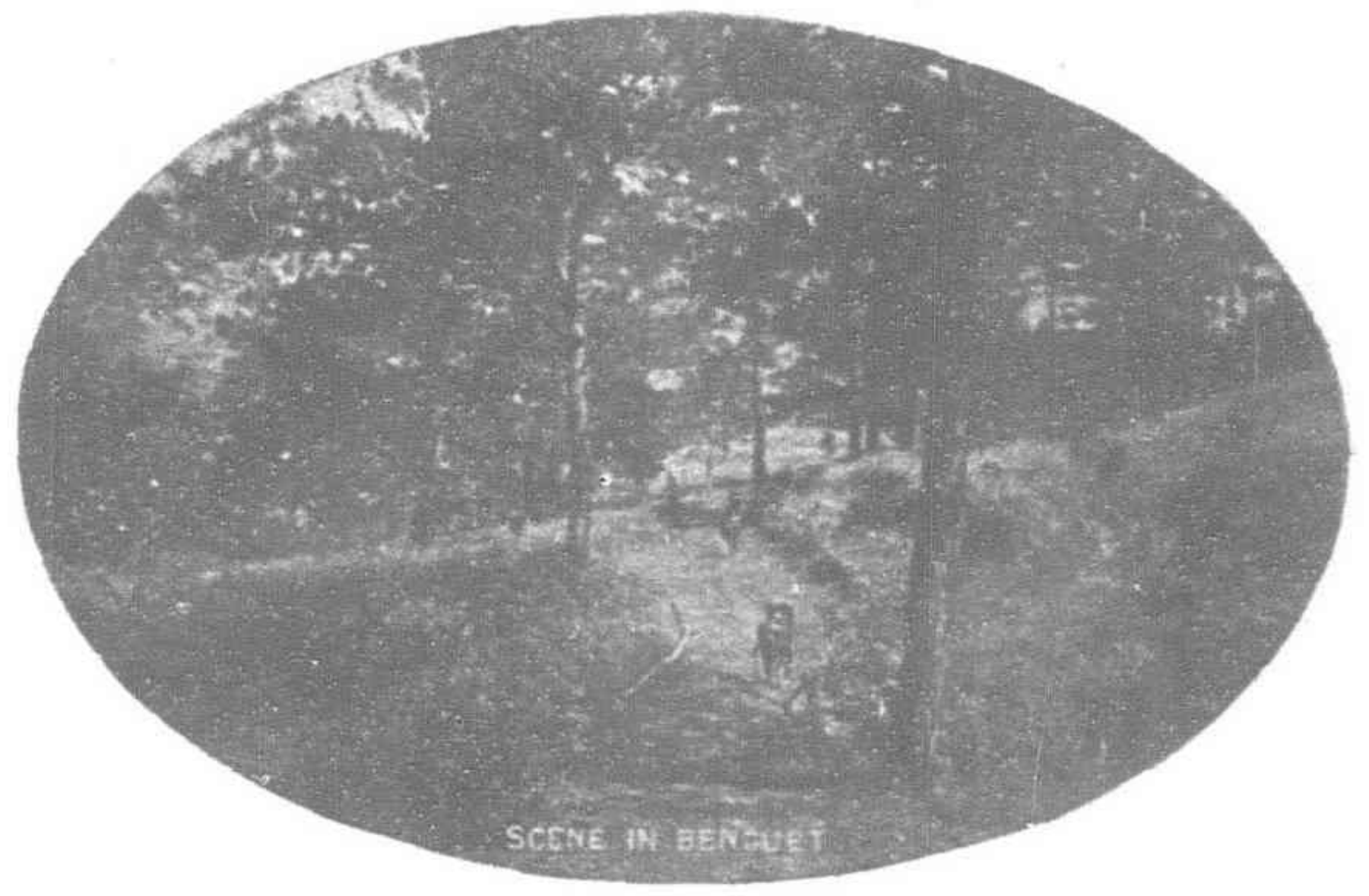

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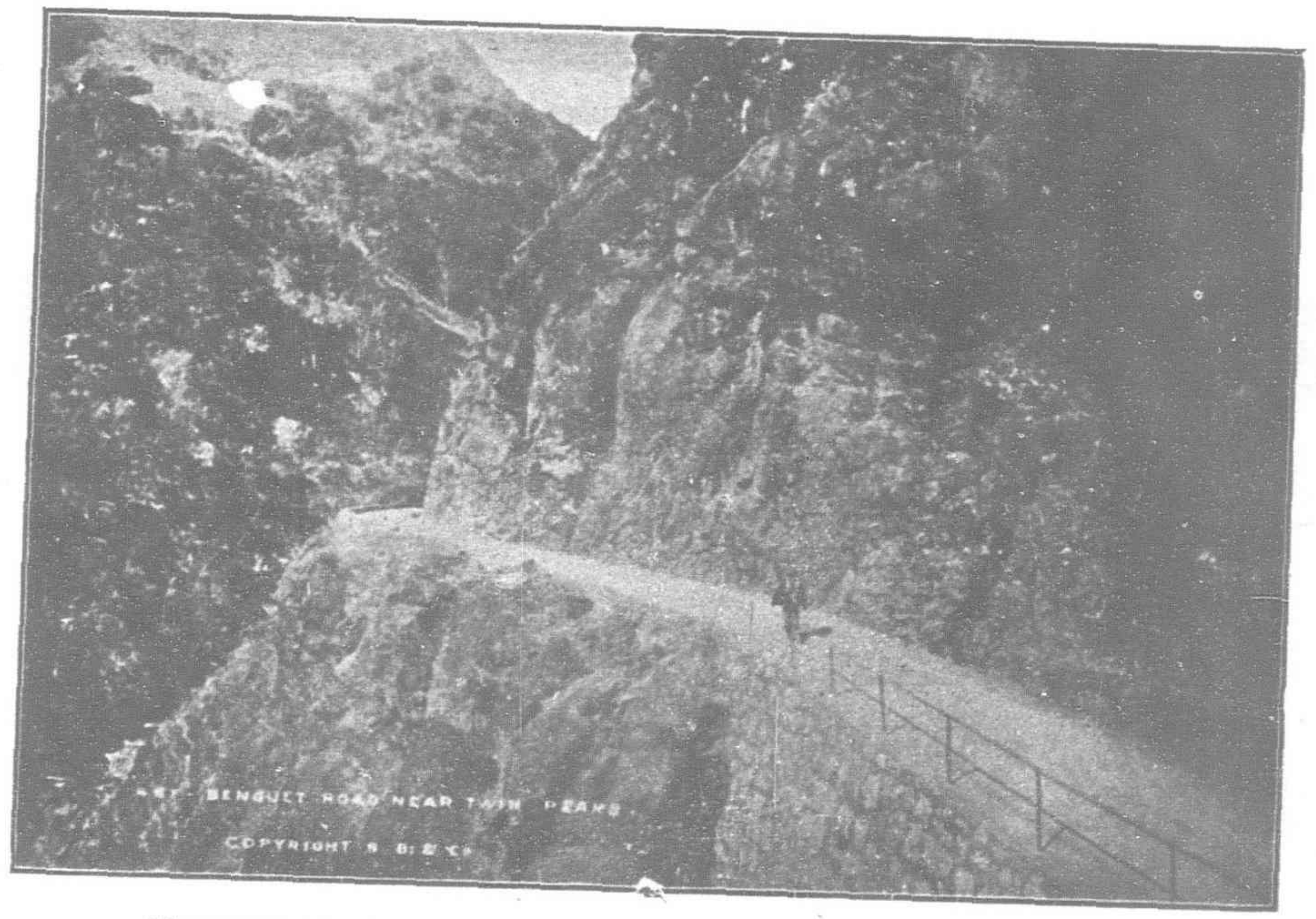

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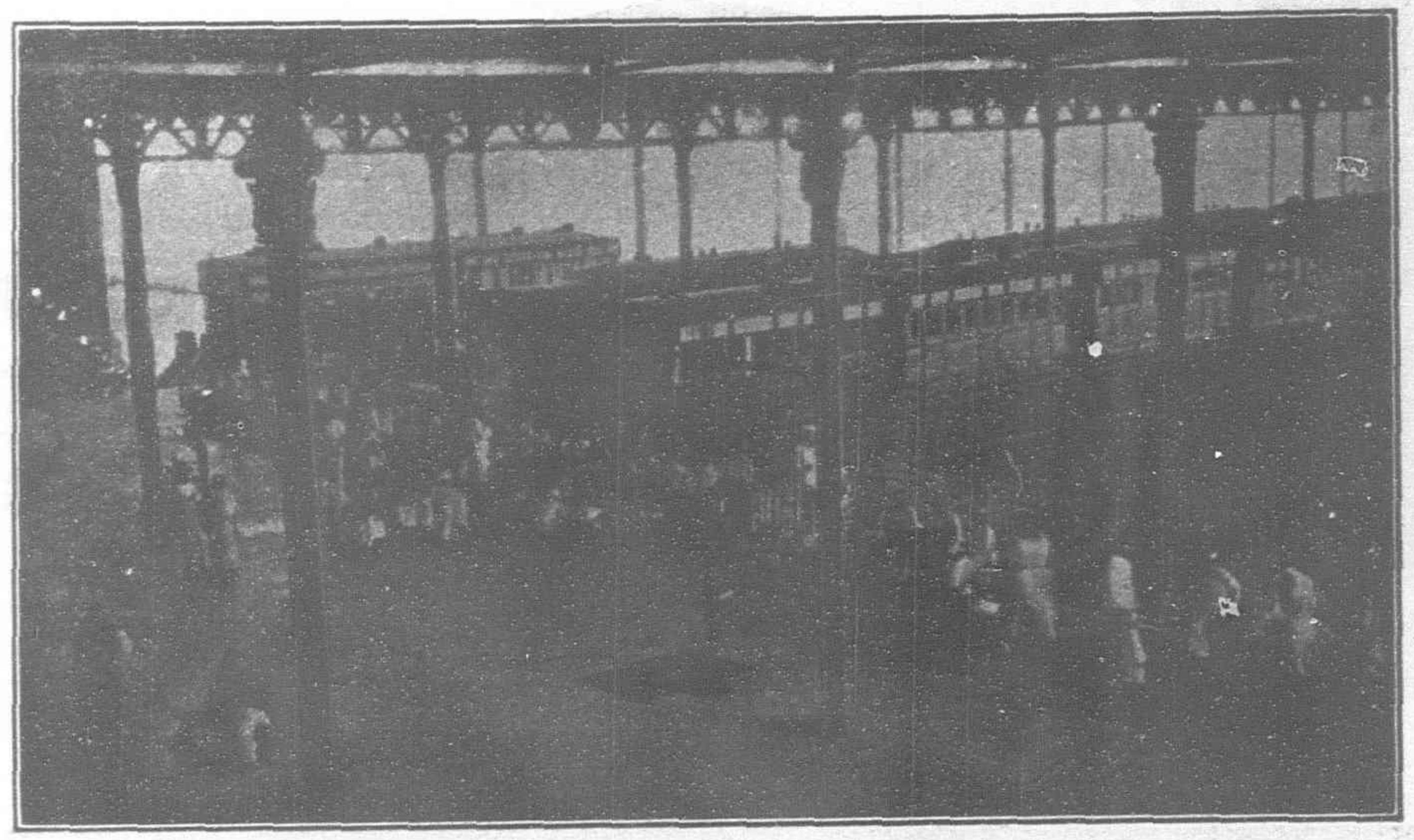
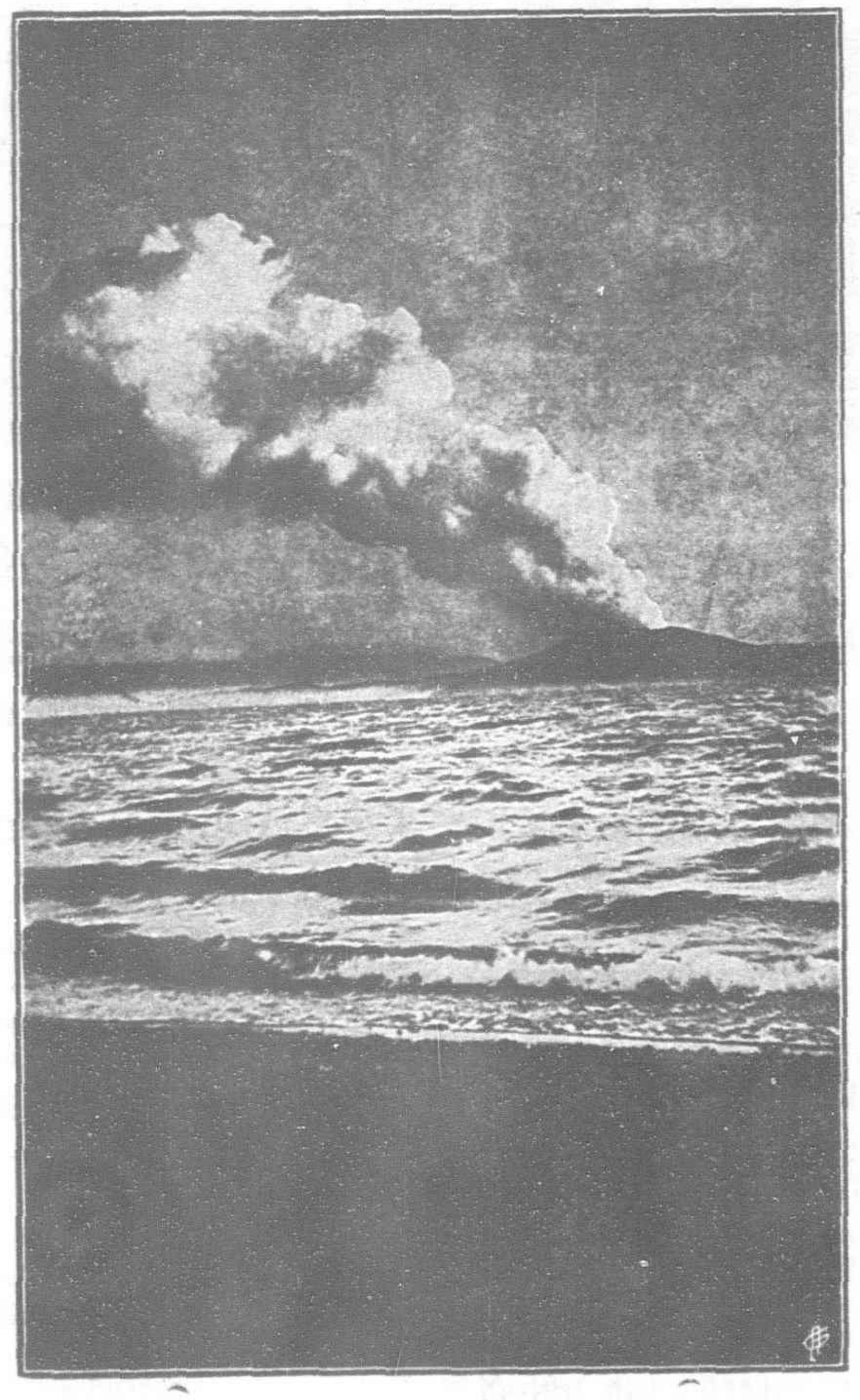


VIEW OF PASSENGER DEPOT AT MANILA, TERMINAL OF MAIN LINE MANILA RAILROAD CO.



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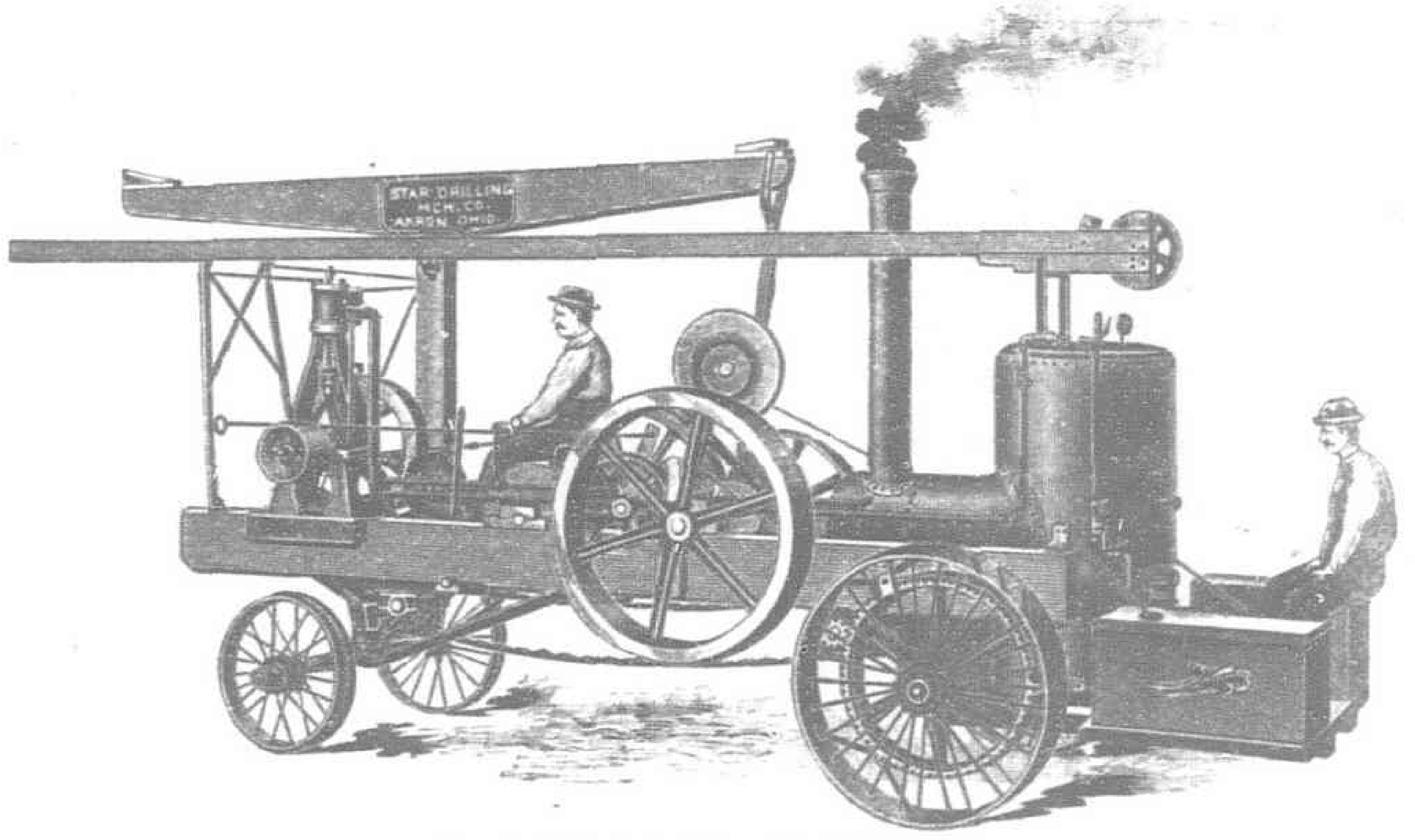
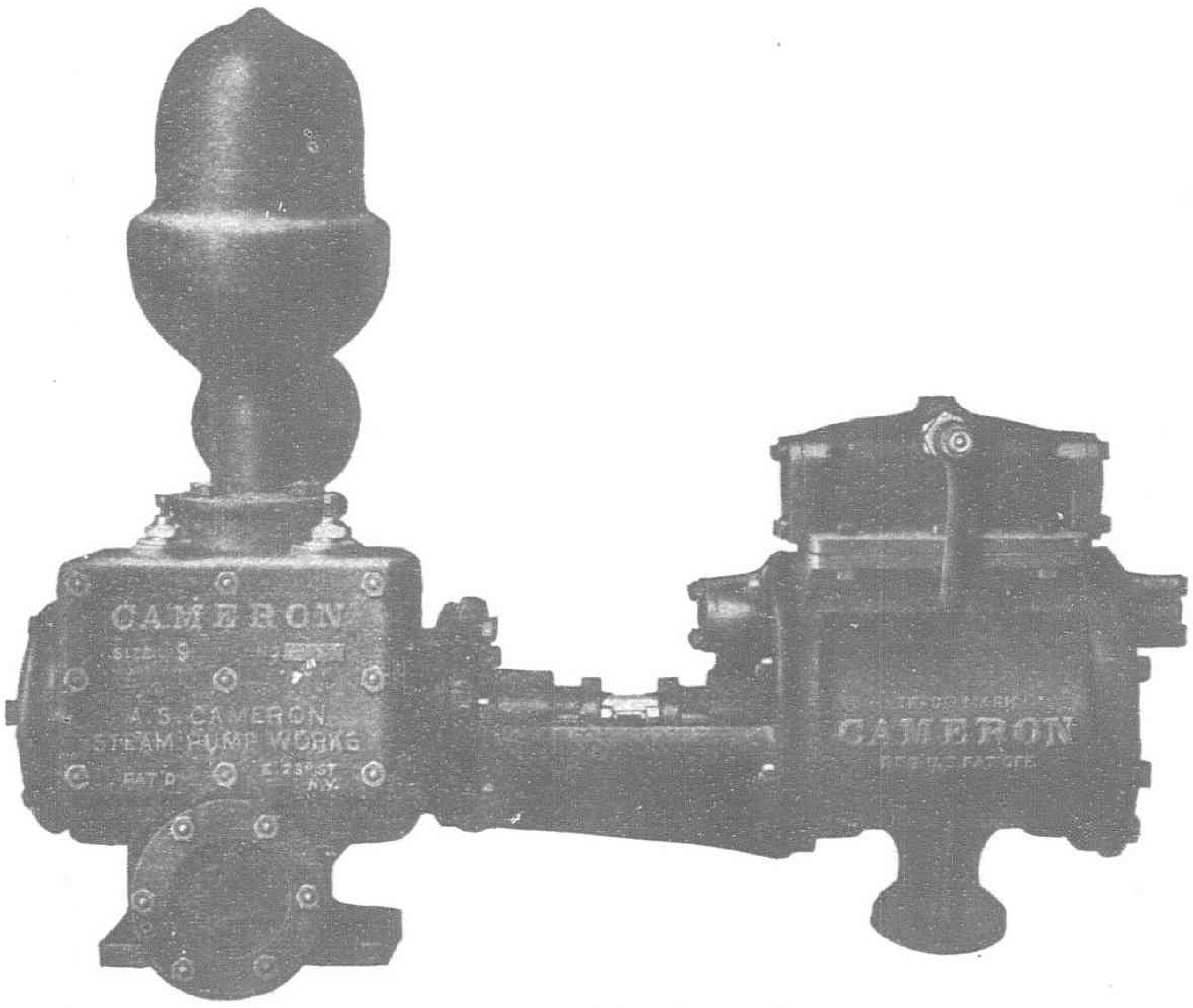
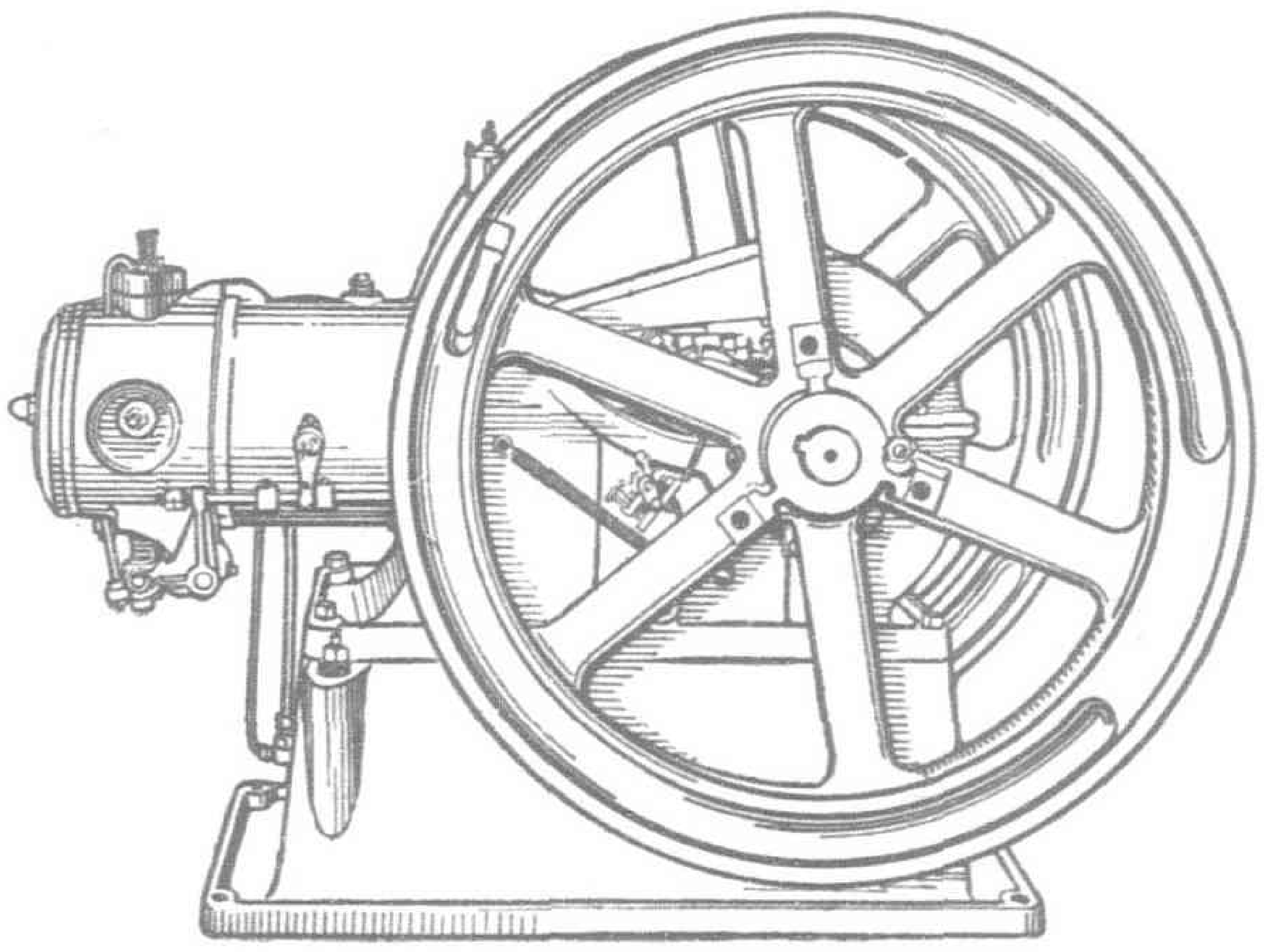


STAR DRILLING MACHINE



CAMERON STEAM PUMP



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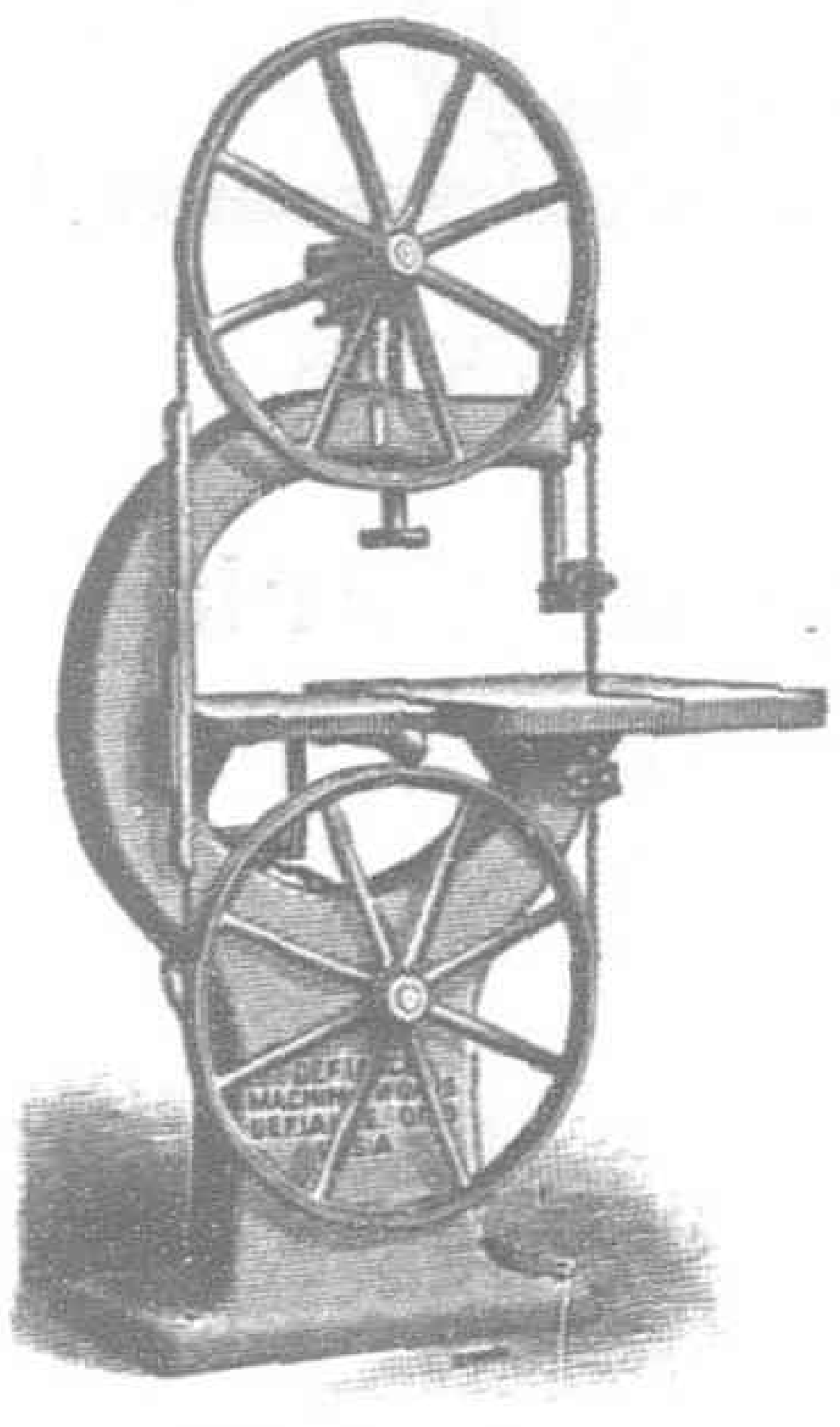
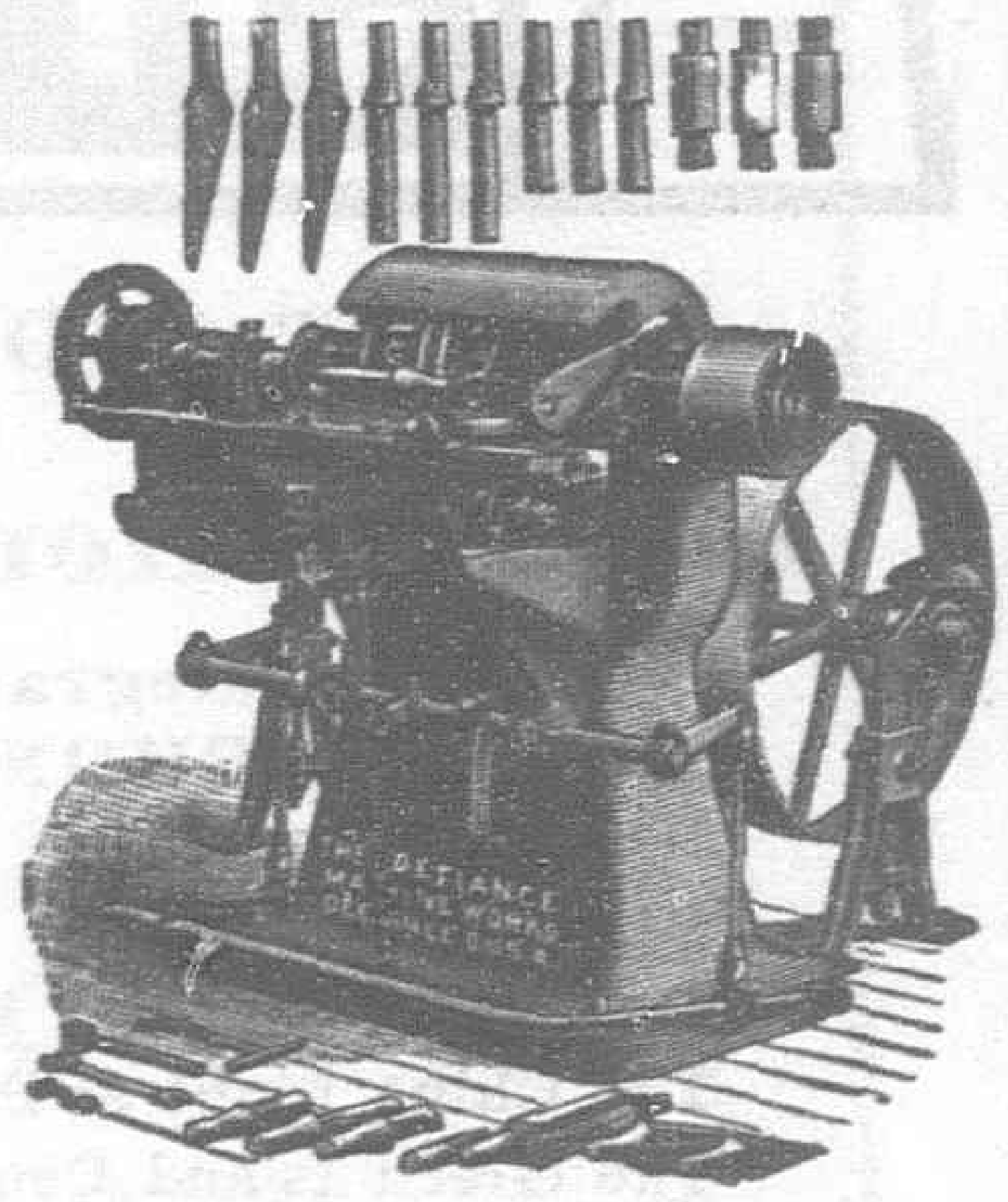
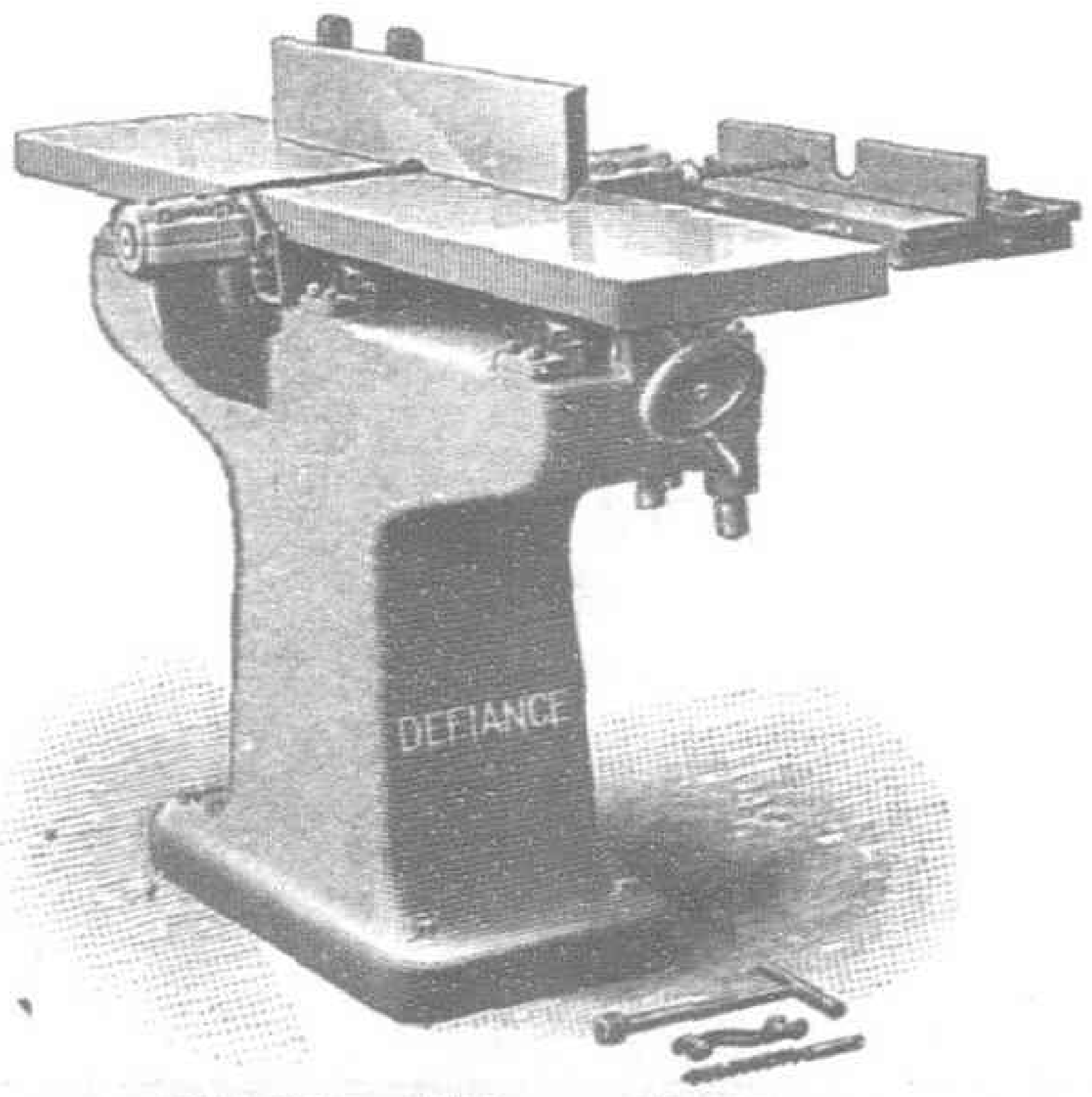


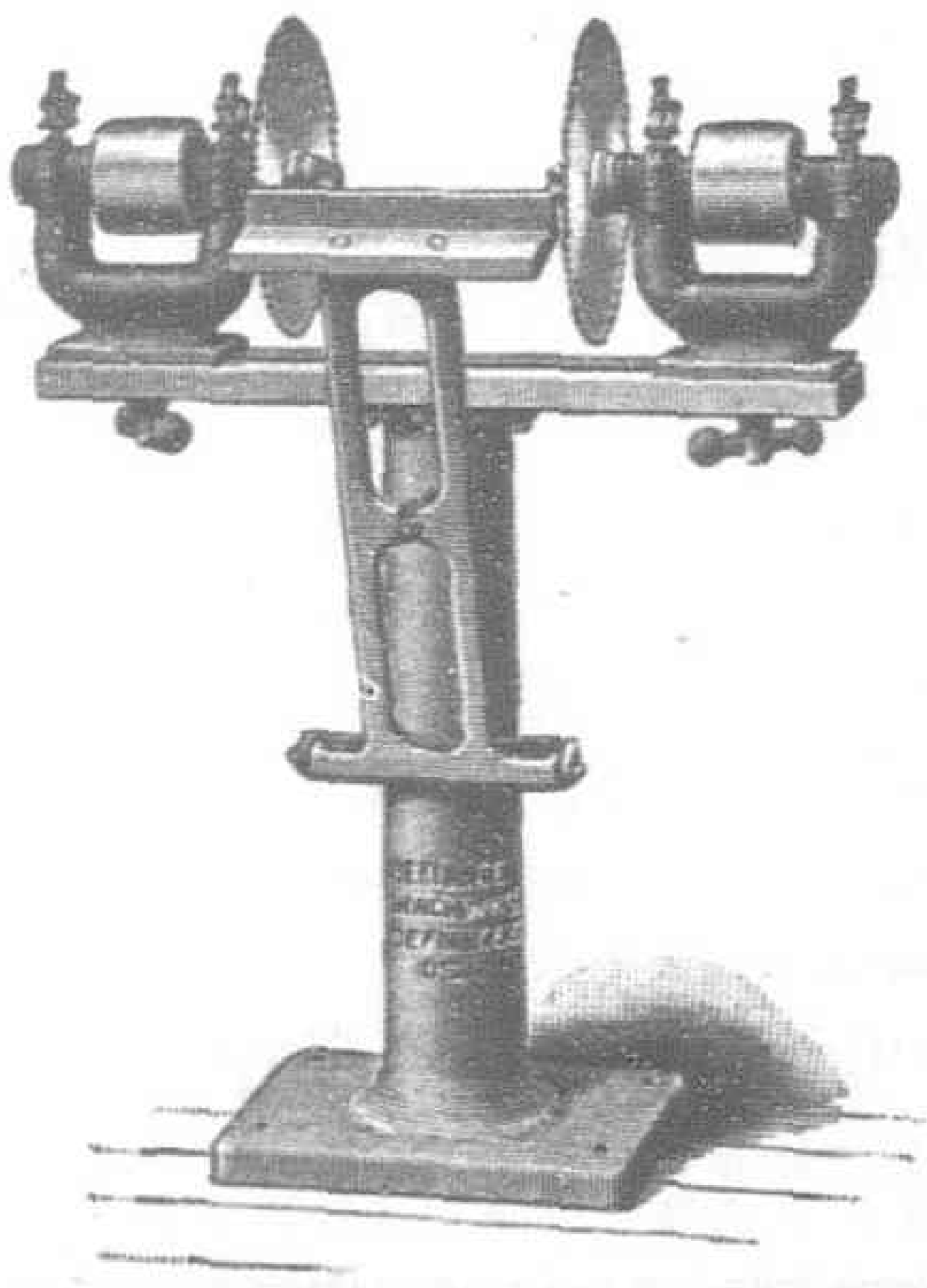
28" Band Saw



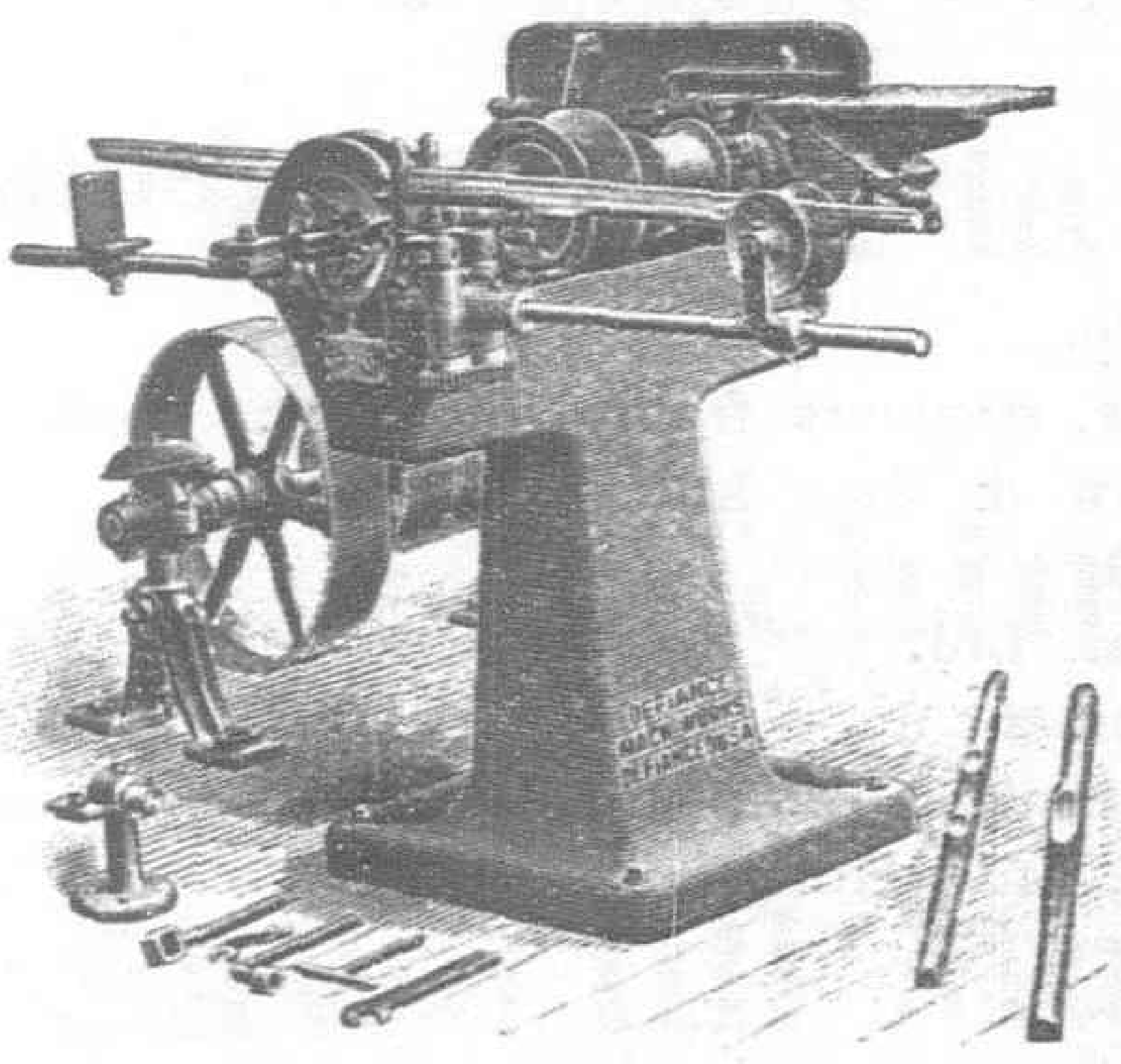
Insulator Pin Lathe



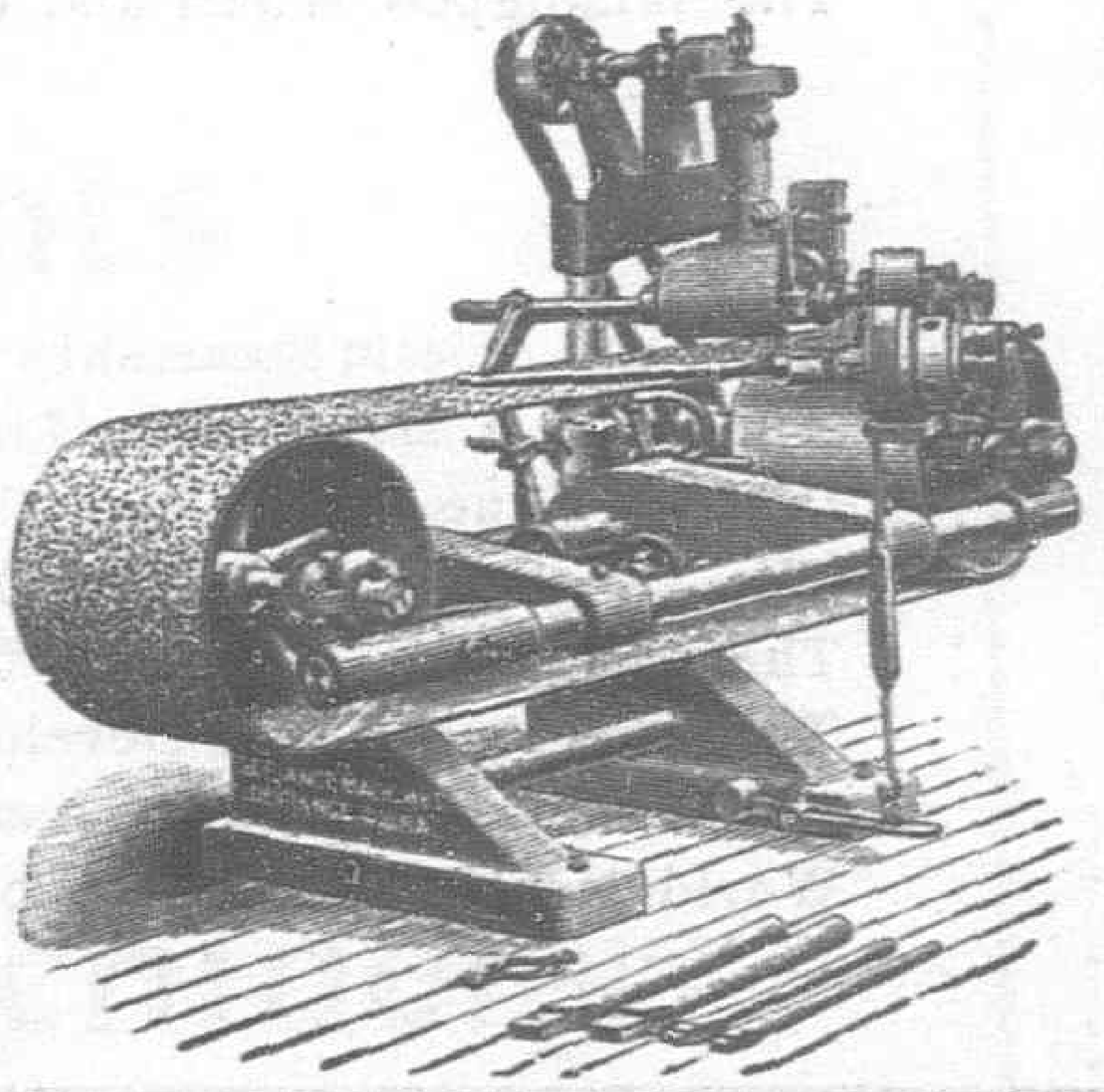
12" Hand Planer & Borer



No. 0 Double Equalizer



No. 8 Shaping, Planing & Cornering Machine



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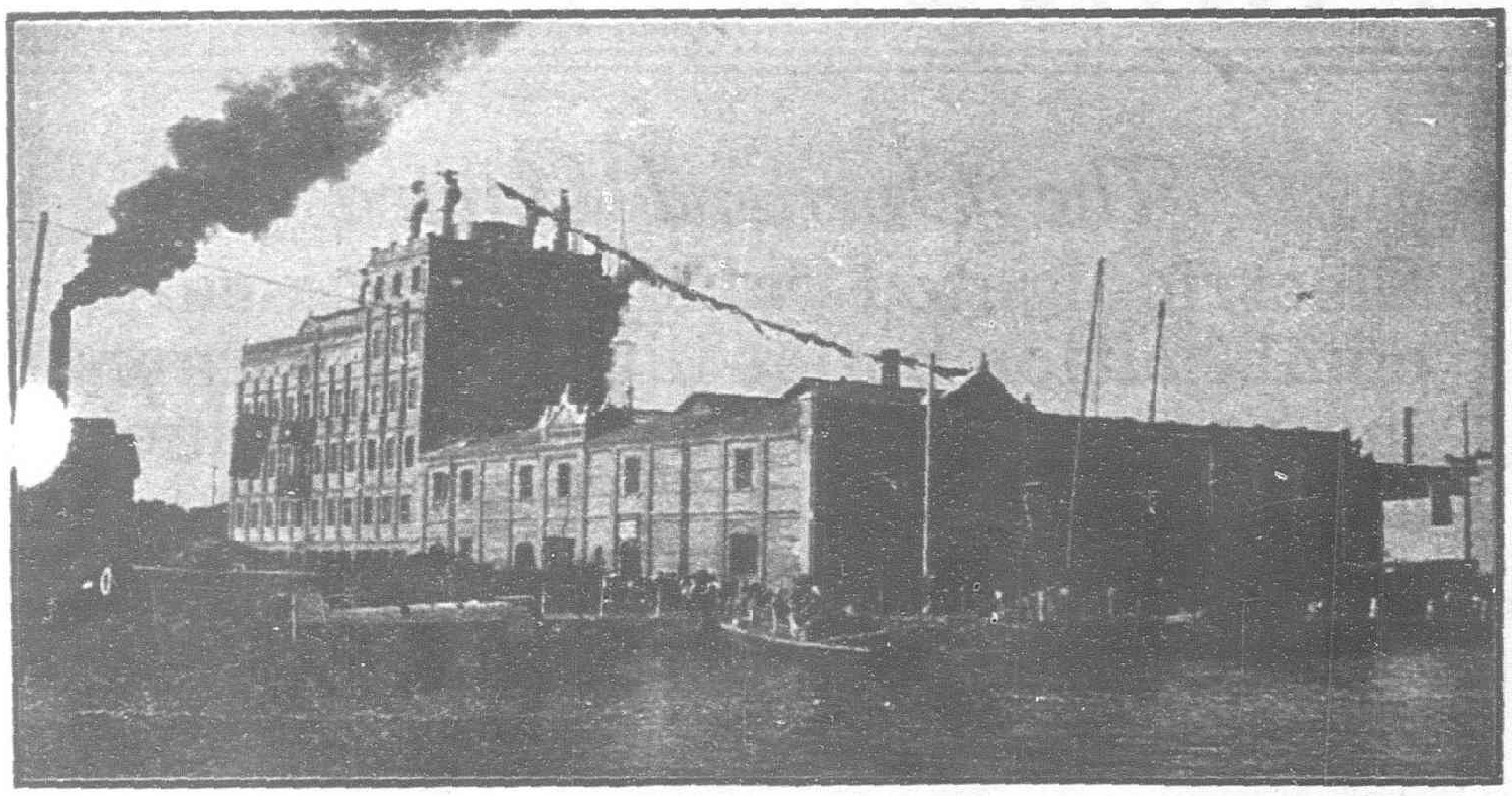

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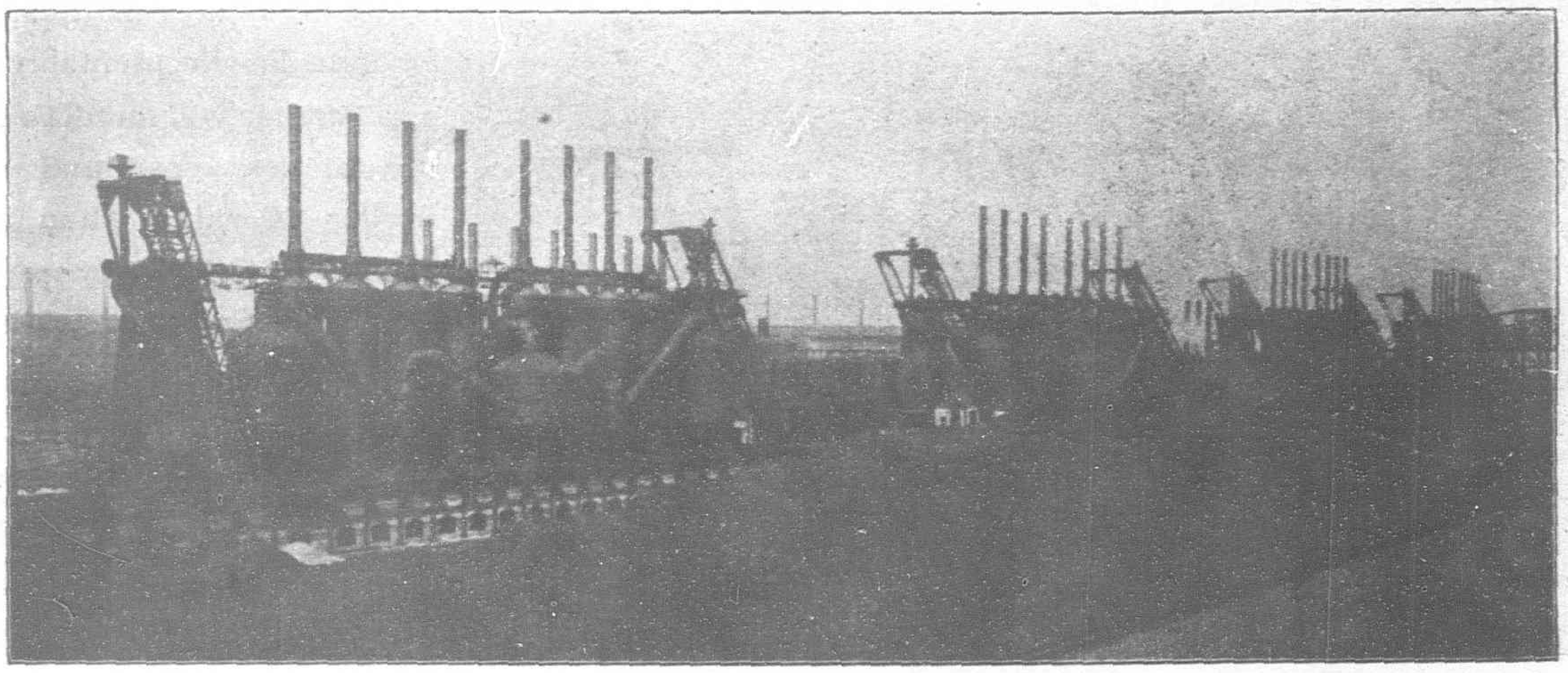

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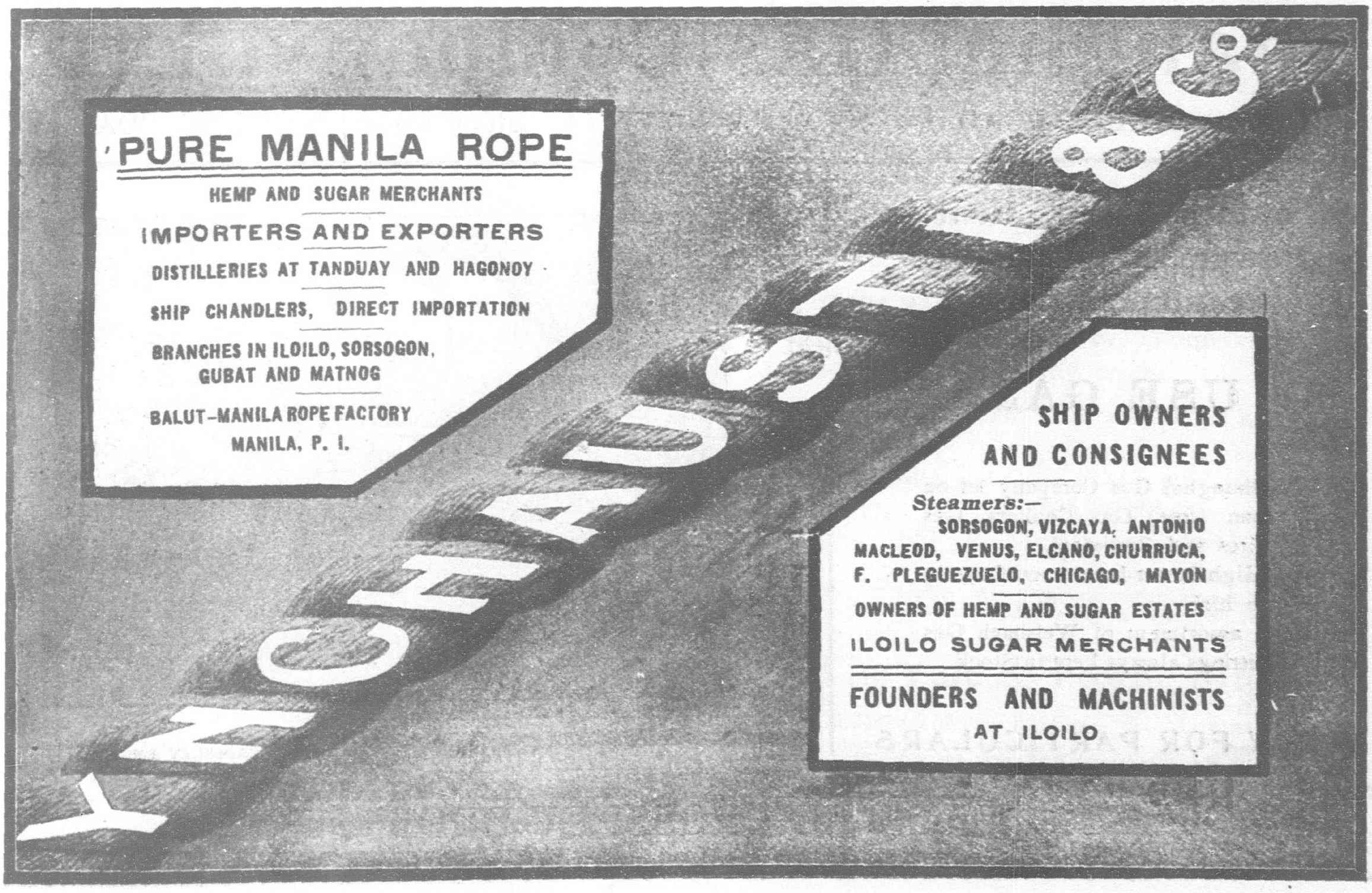
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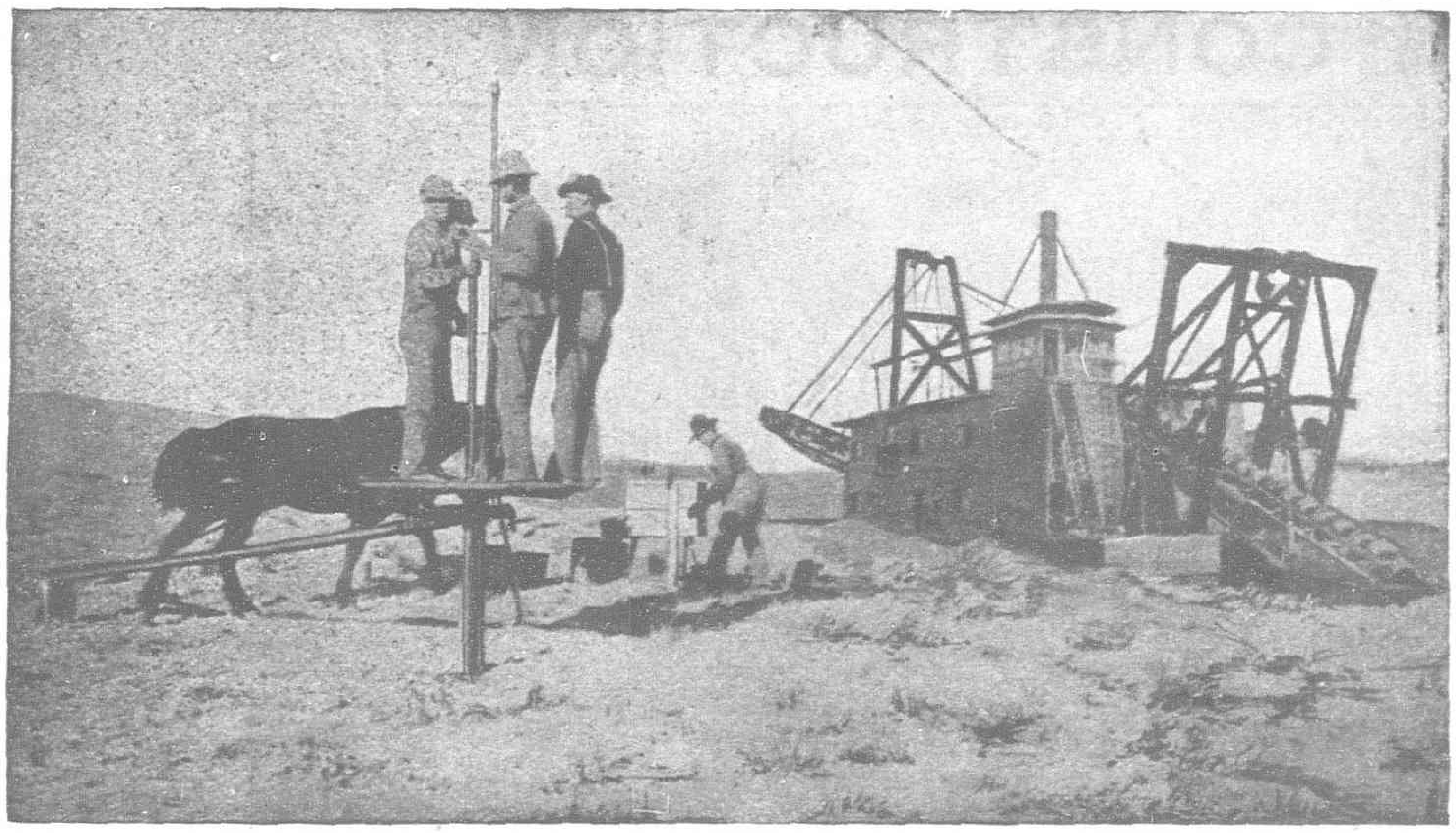

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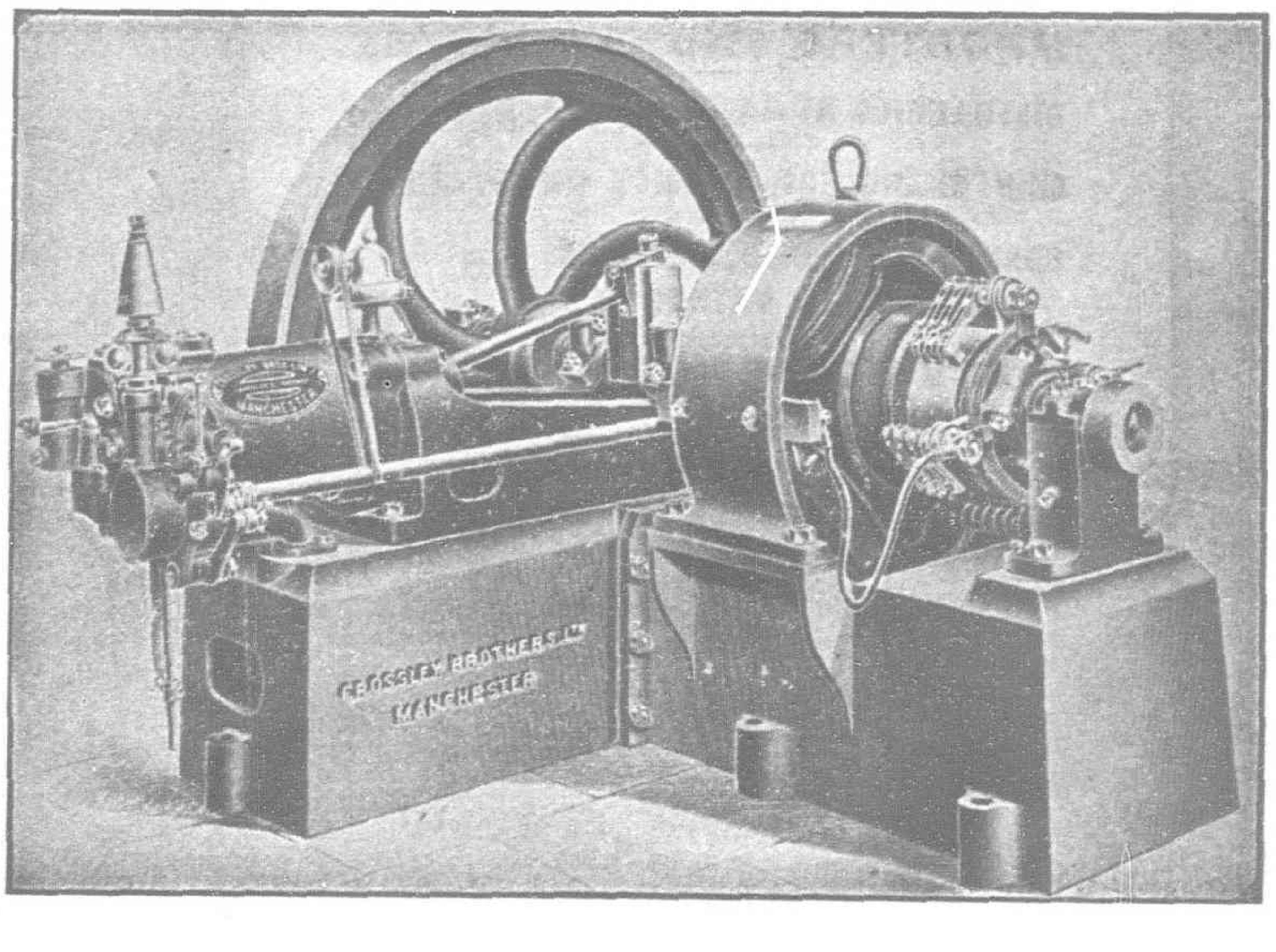

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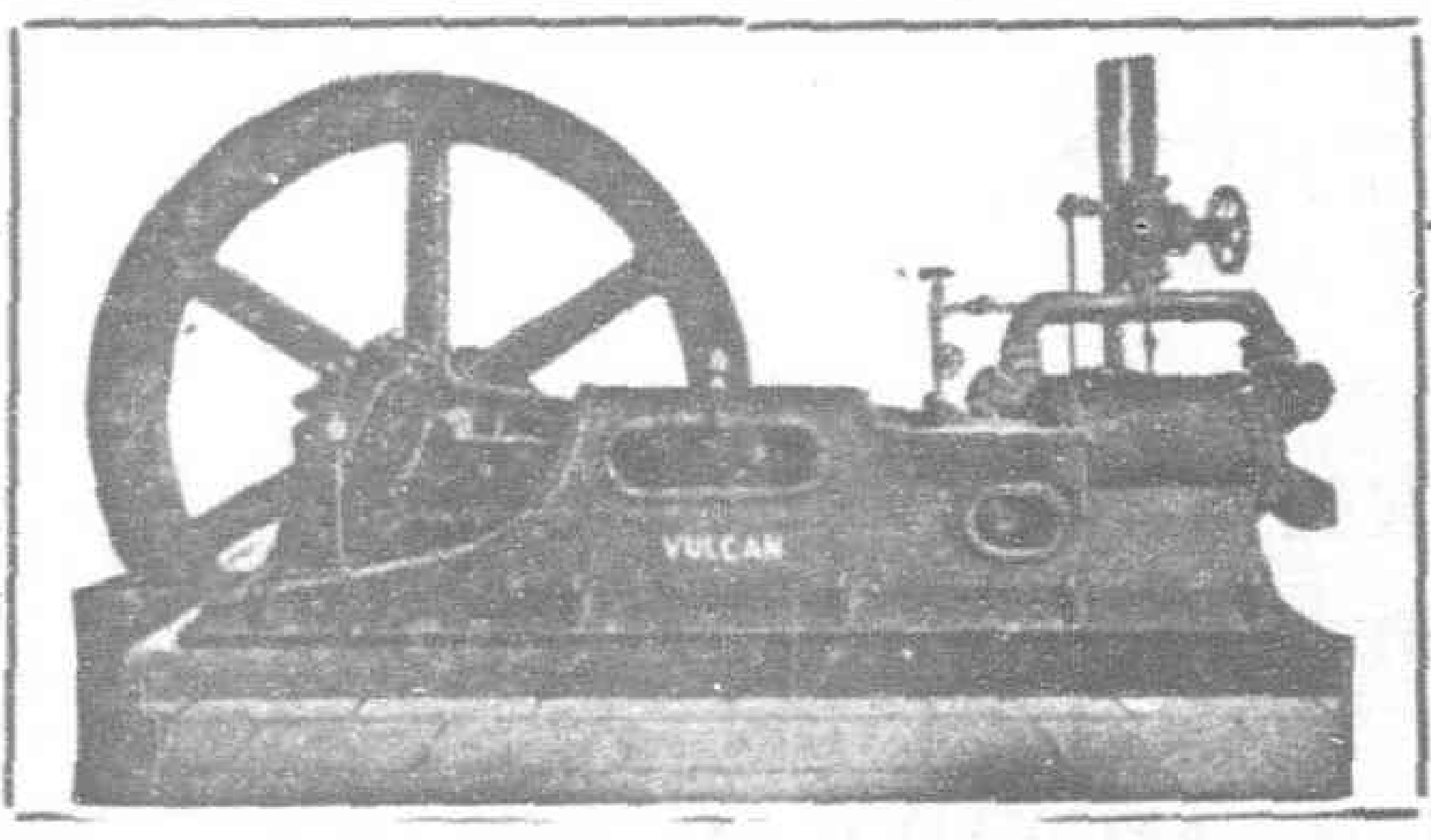

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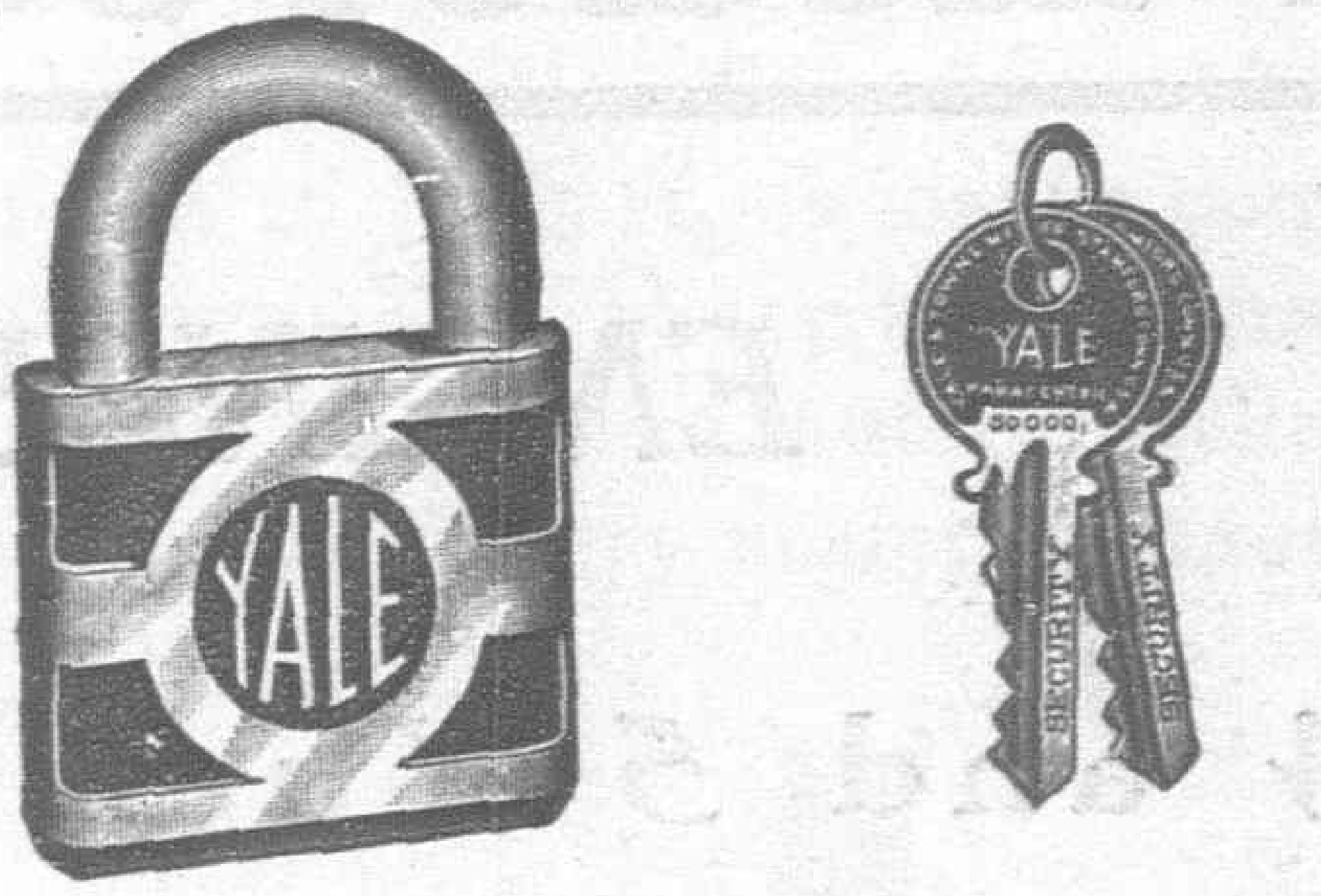

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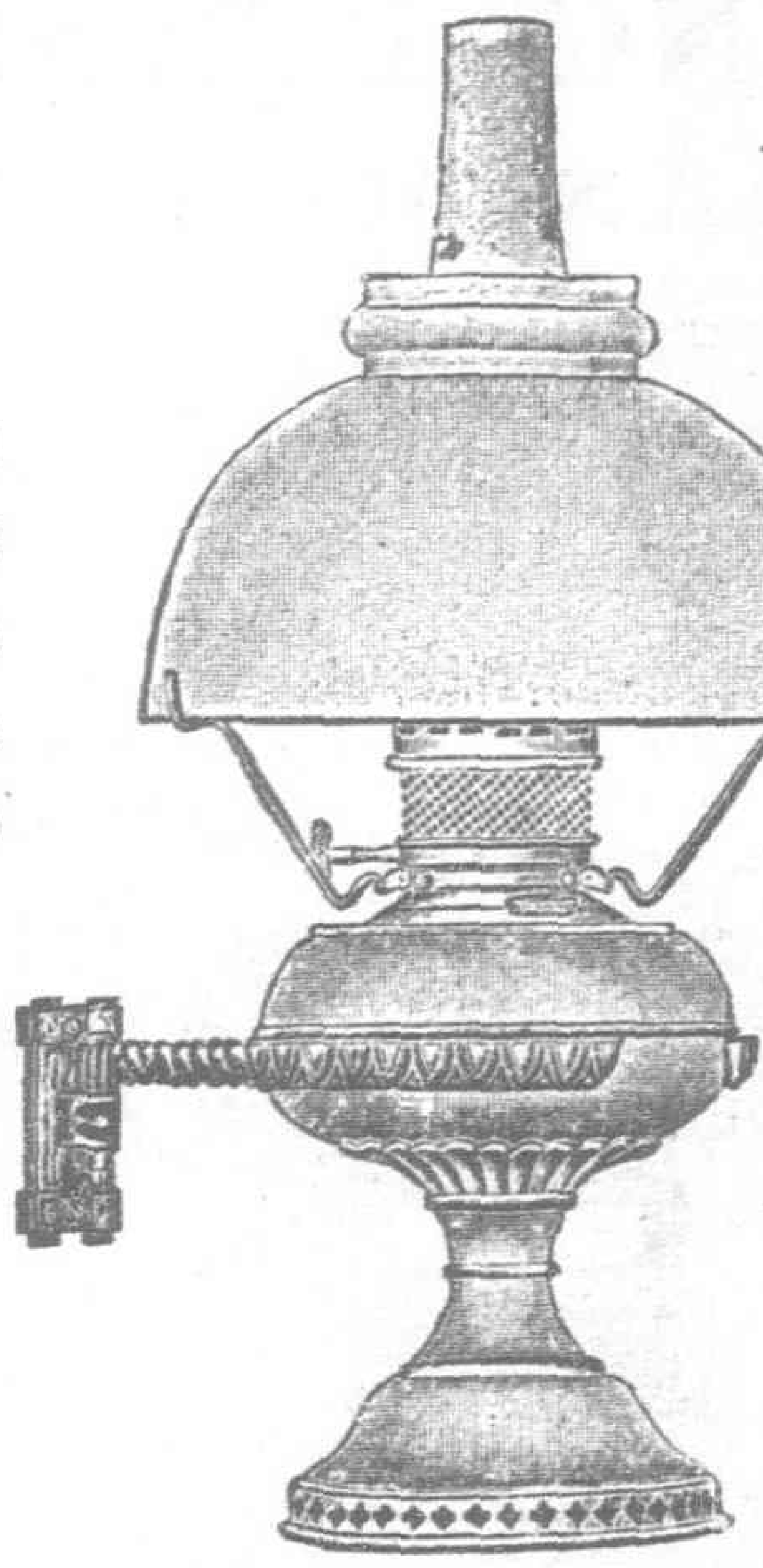

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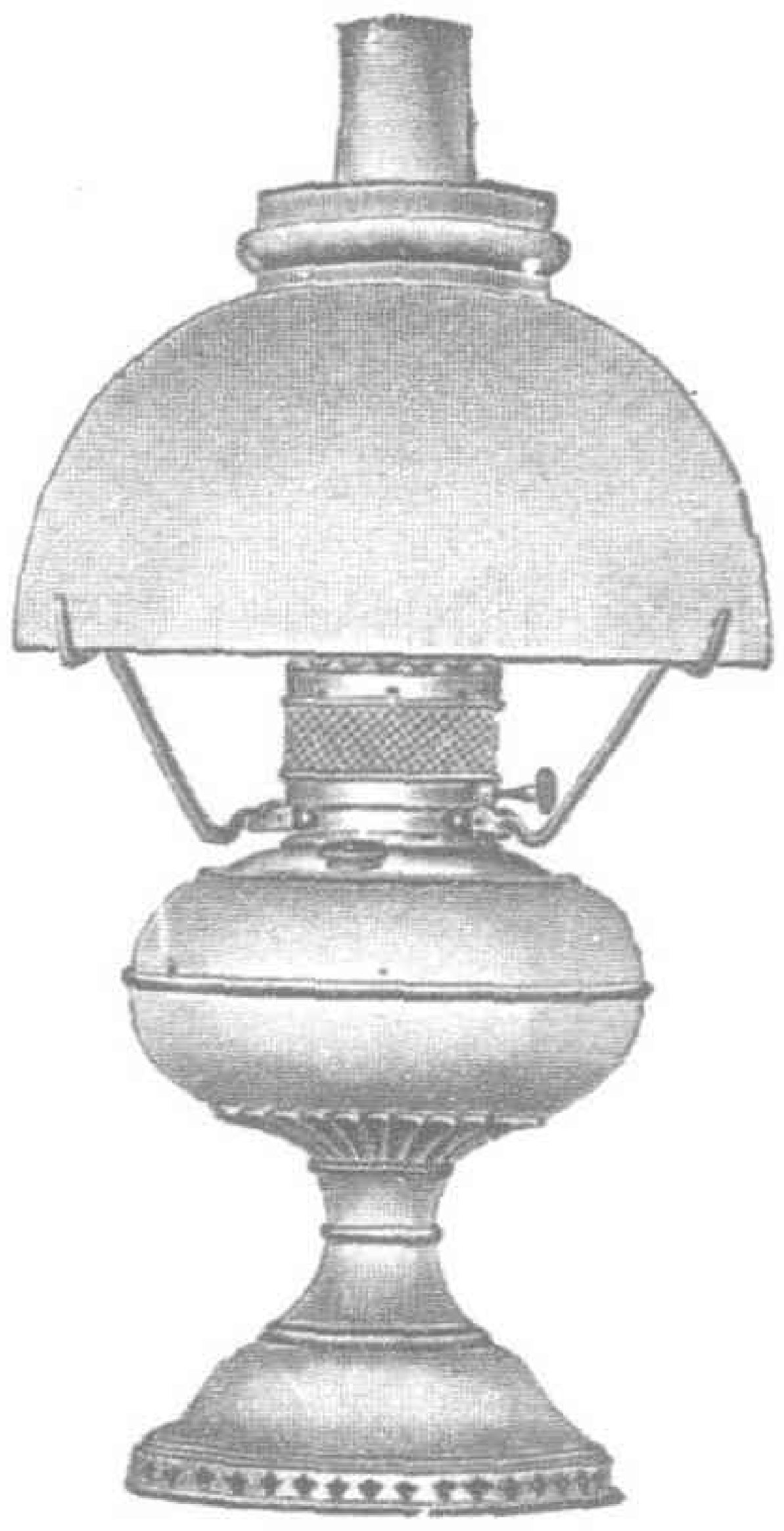

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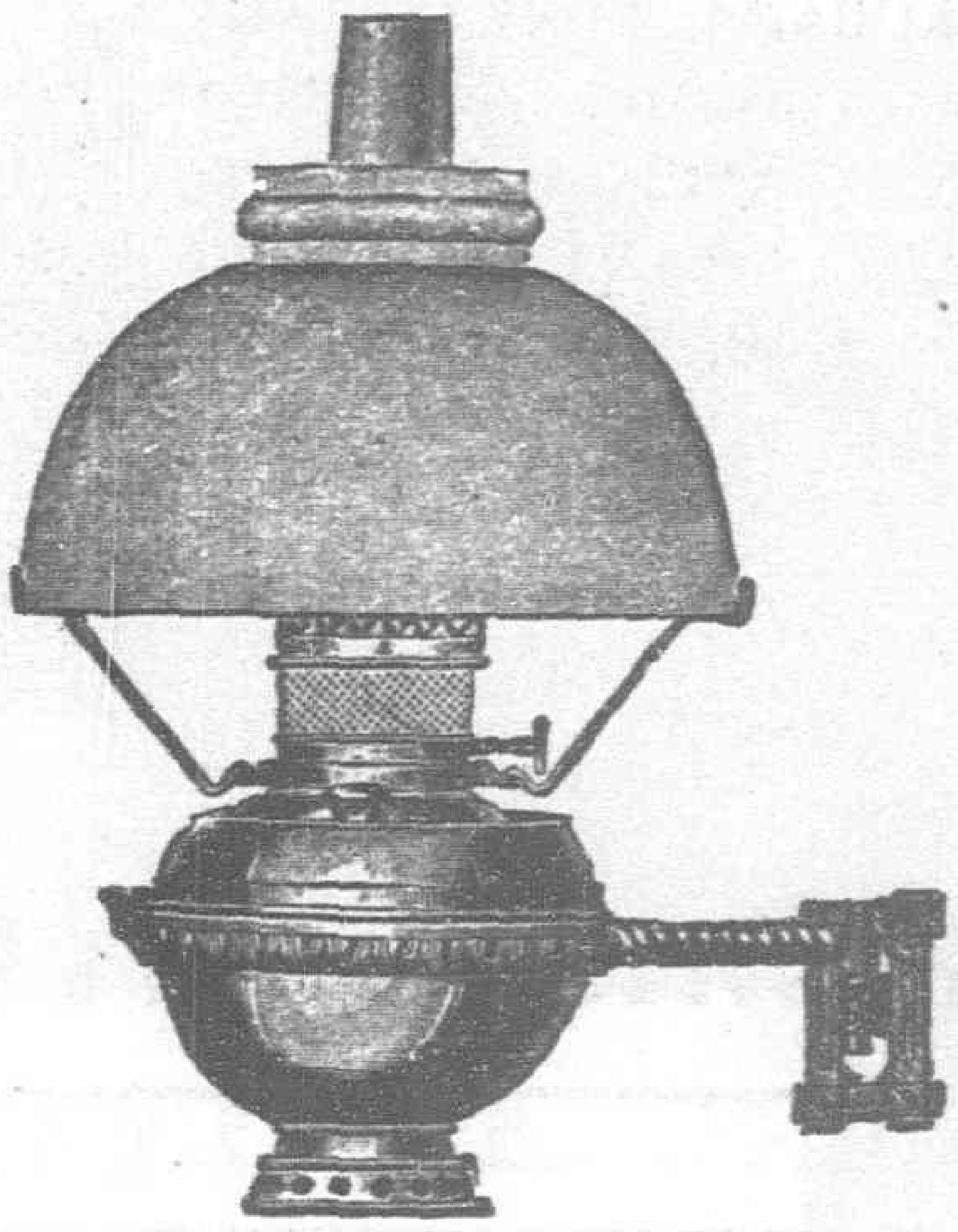

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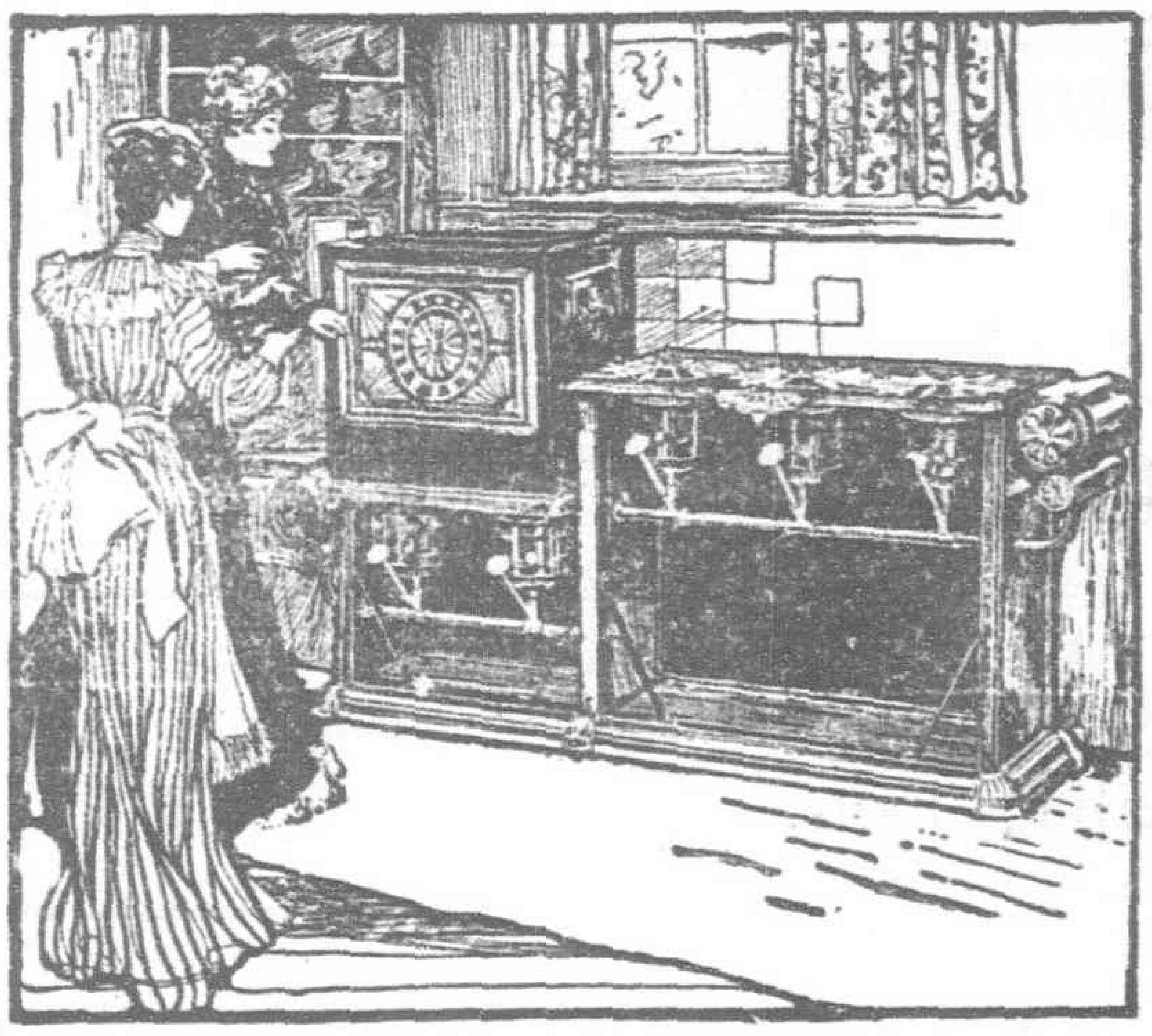

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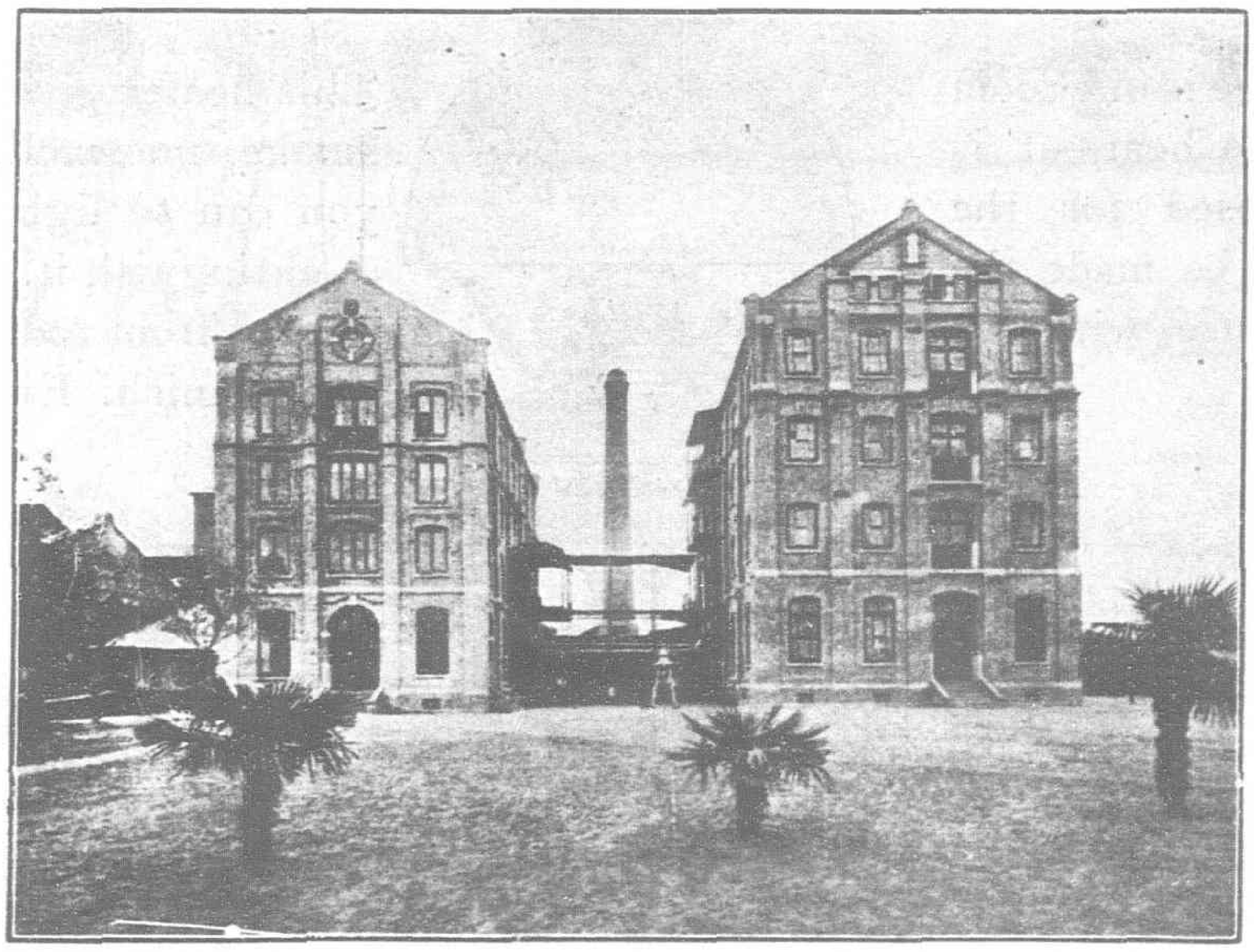

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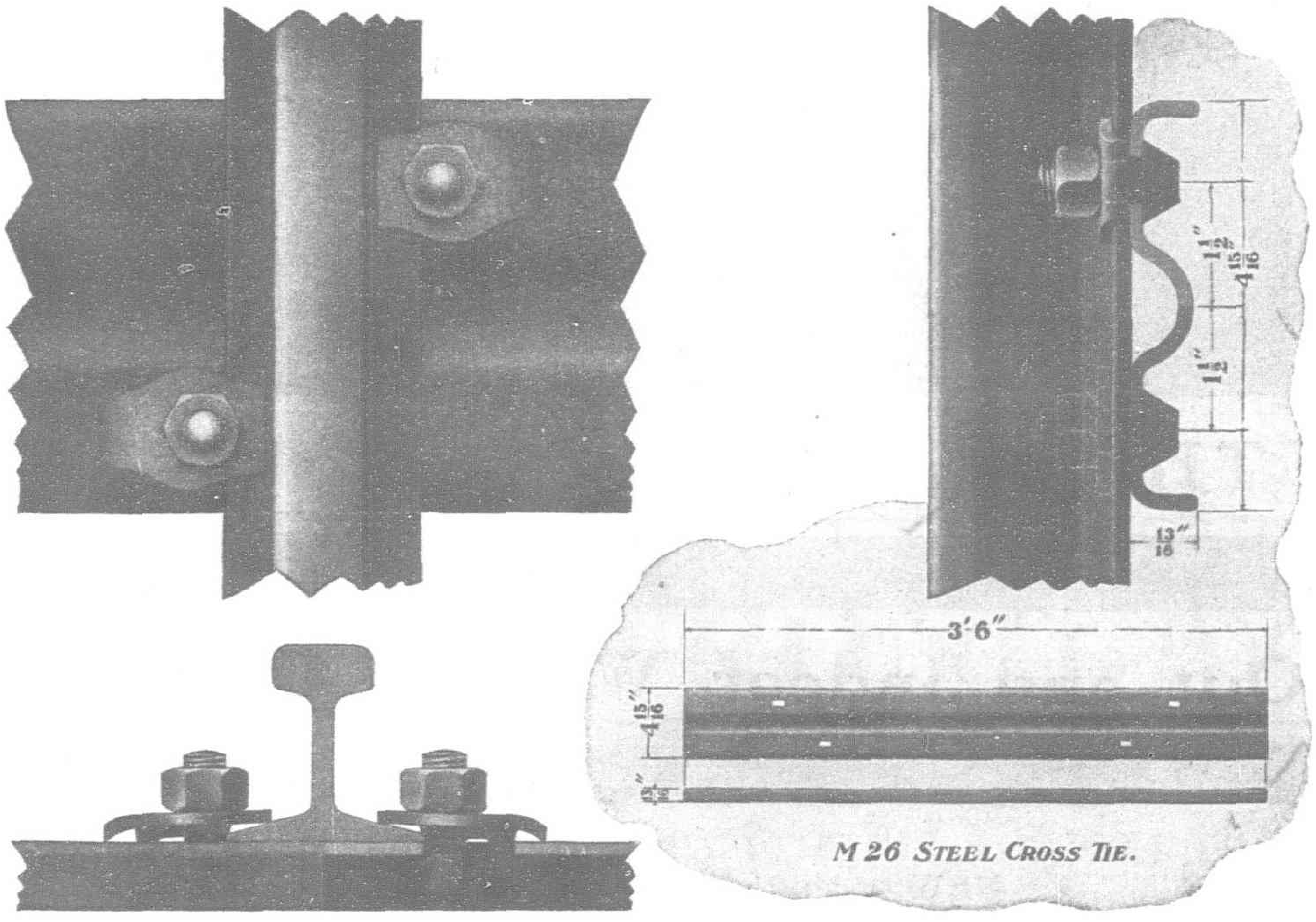

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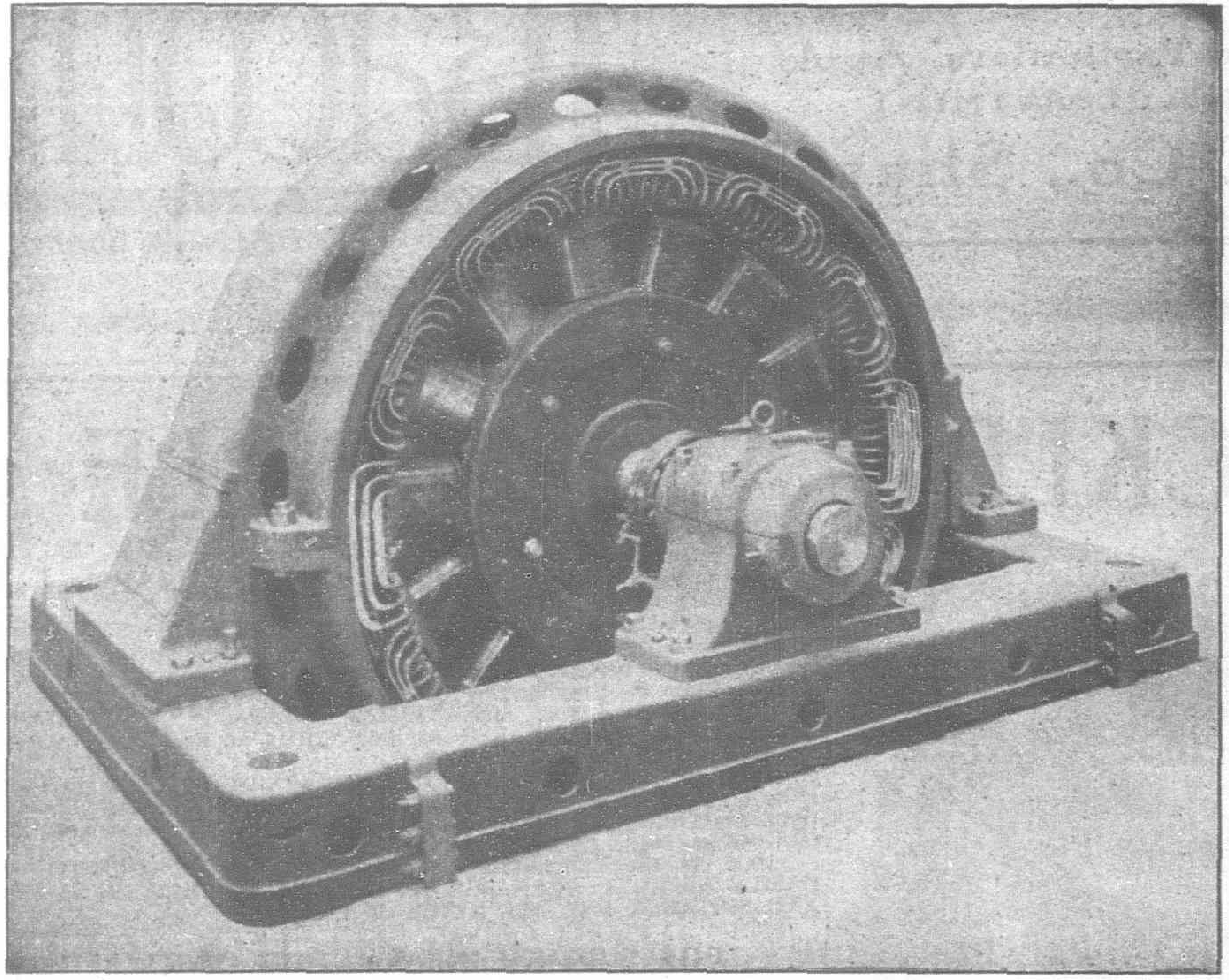

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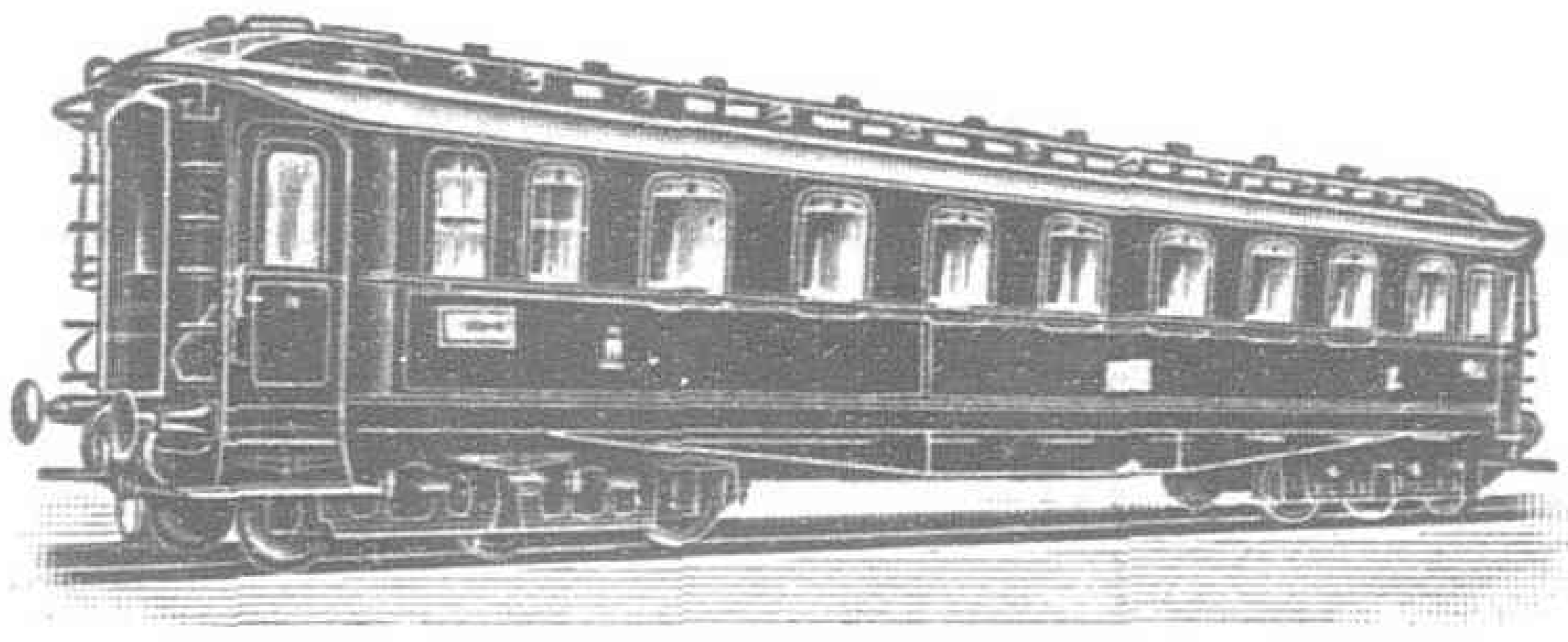

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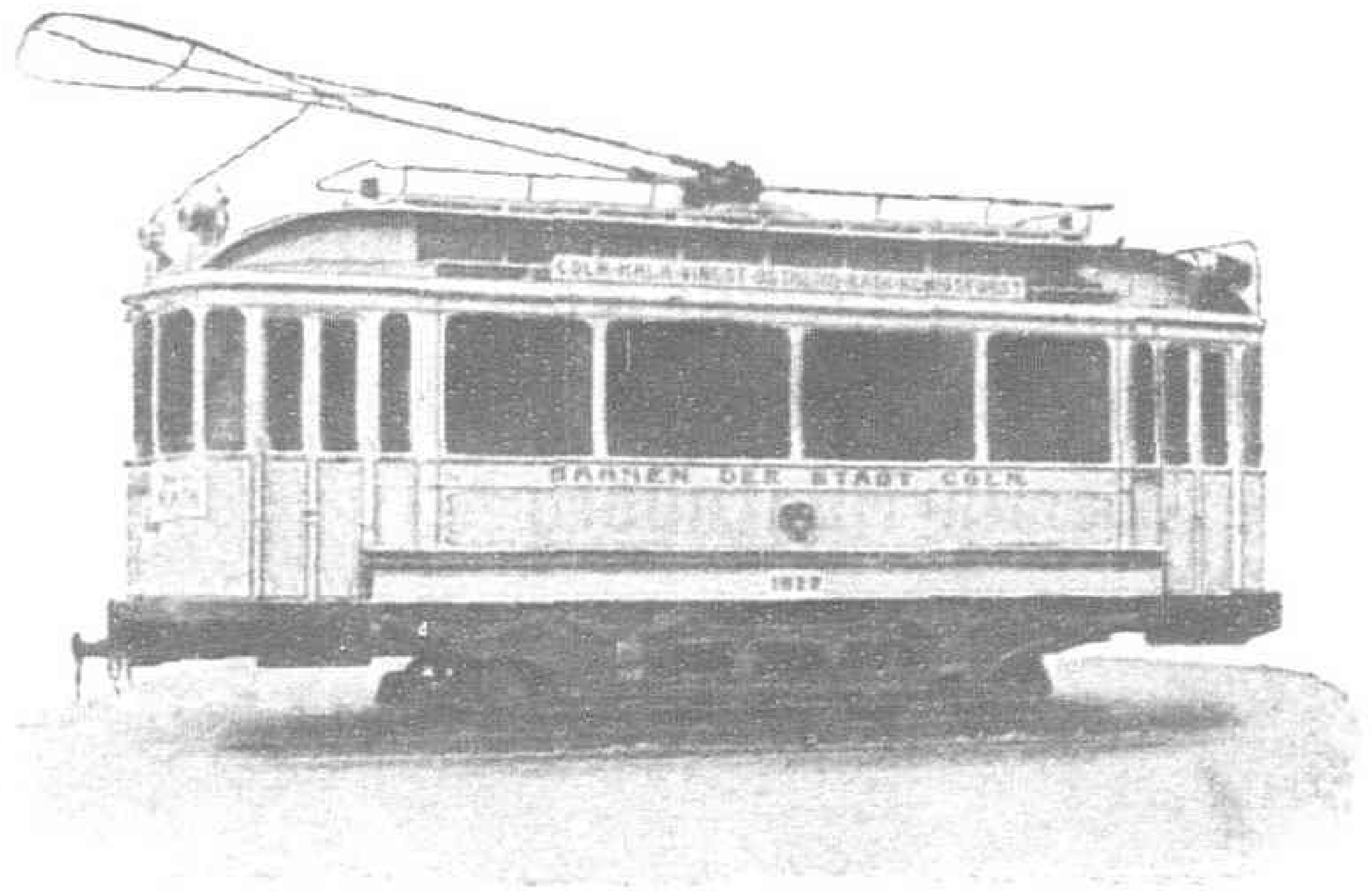

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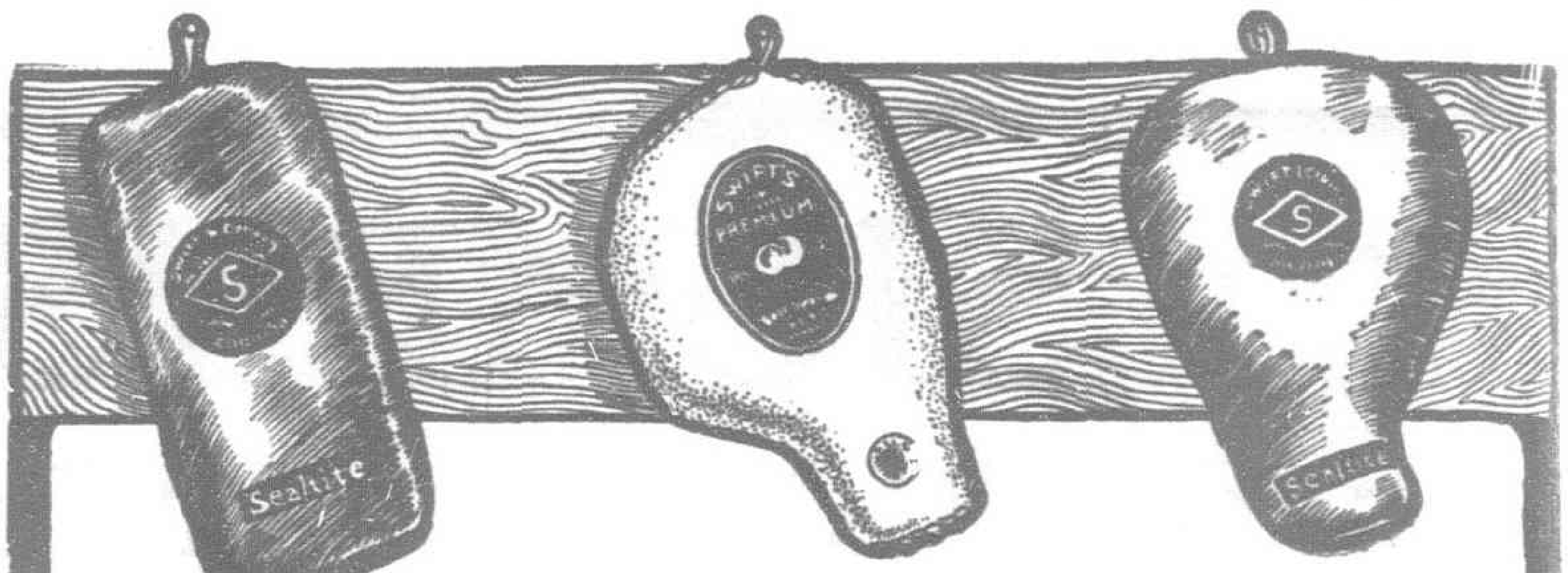

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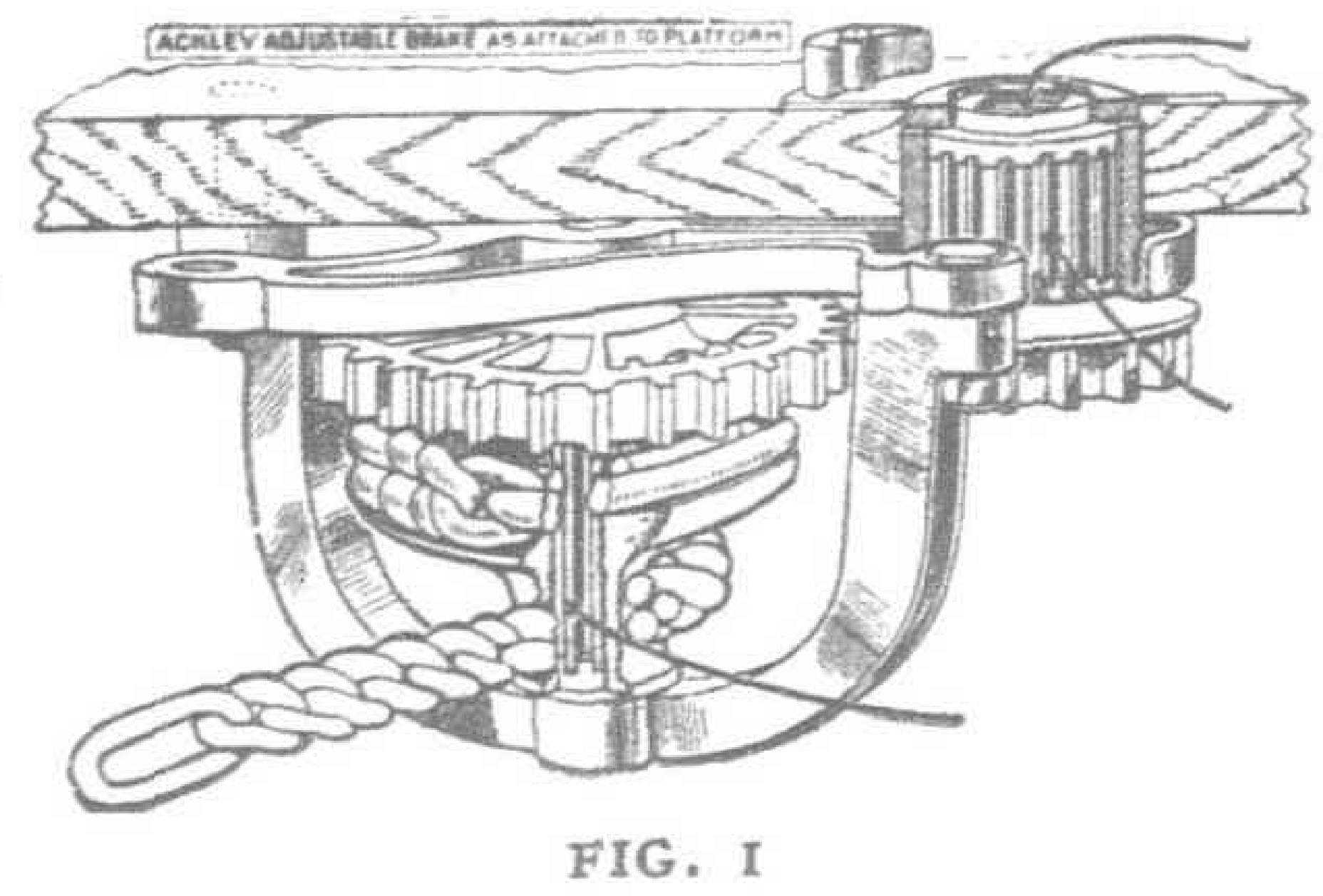

FIG. 1

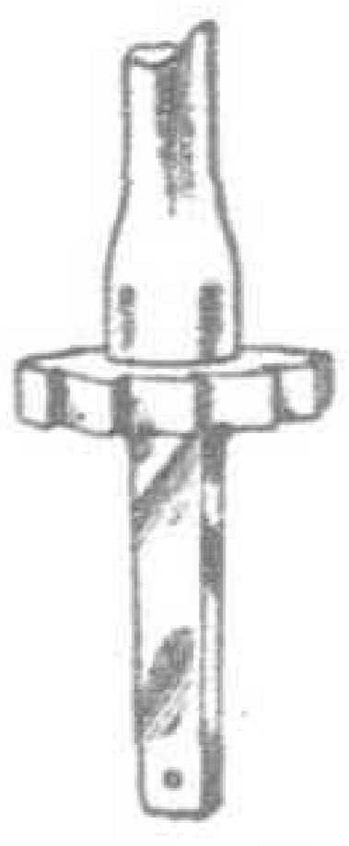

FIG. 3

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It is the only gear brake which has no staff bearing in the frame. The journaling of the pinion (Fig. 4), in the frame (Fig. 3 at D), independently of the staff (Fig. 2), places the gears at a fixed position, preventing BINDING, which occurs to gear brakes having staff bearings in frame. (See THE OLD—Figs. 5 and 6, G and I.)

Here is the conclusion: It is EASY AND INEXPENSIVE TO INSTALL; POWERFUL, YET EASILY APPLIED; RELEASES QUICKLY; NO BINDING OF STAFF OR GEARS; ADAPTED TO ANY AND SUITABLE FOR ALL KINDS OF CARS.

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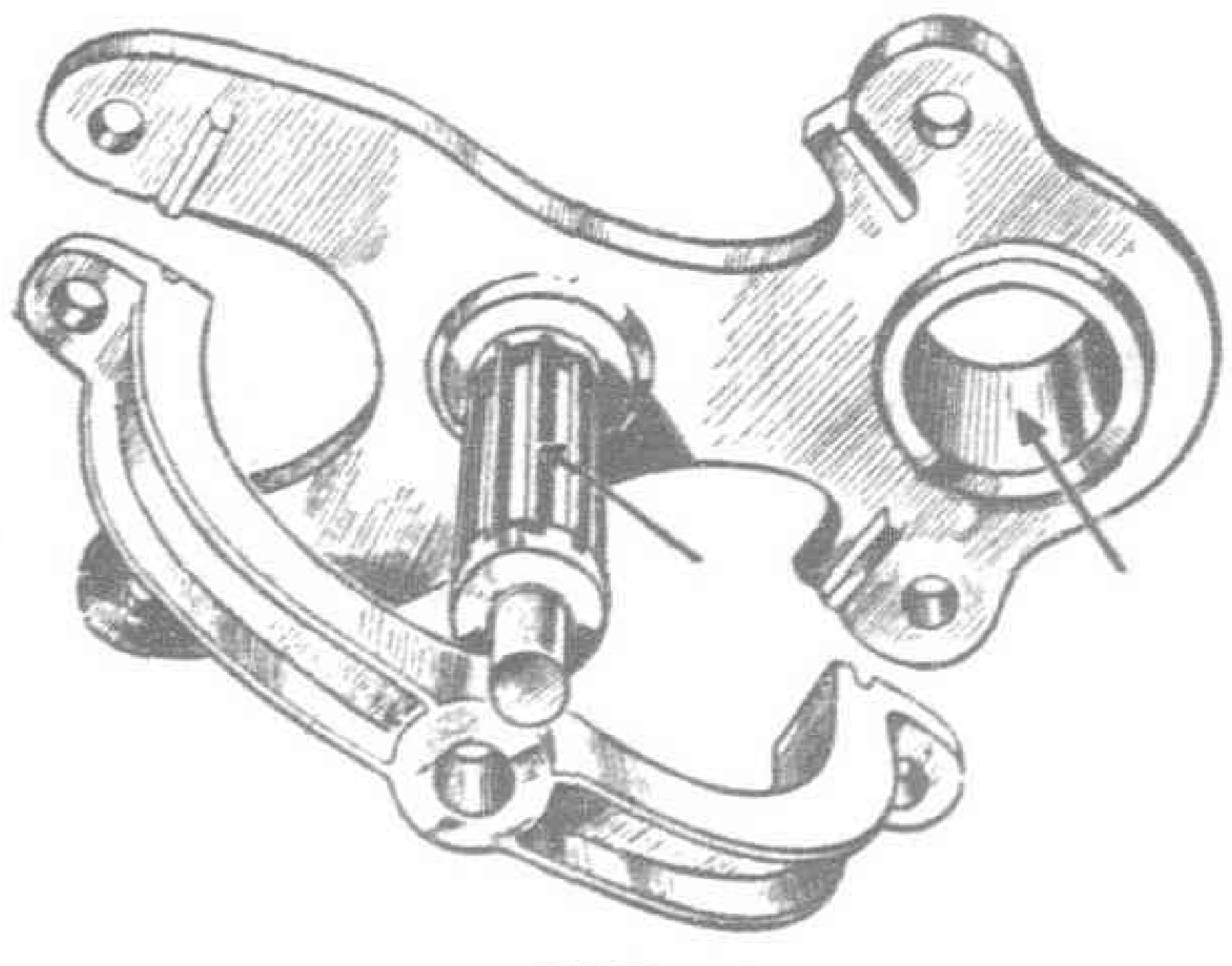

FIG. 2

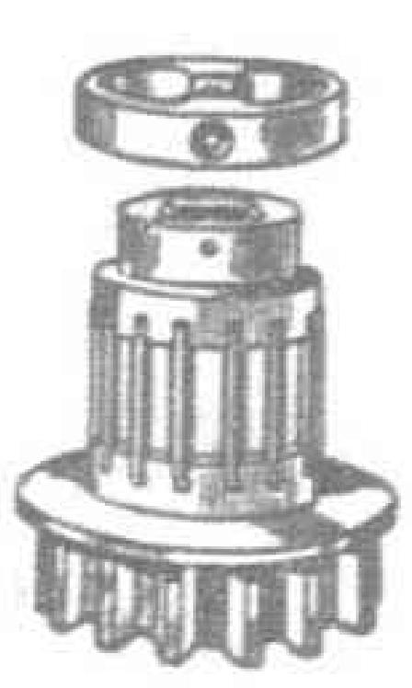

FIG. 4

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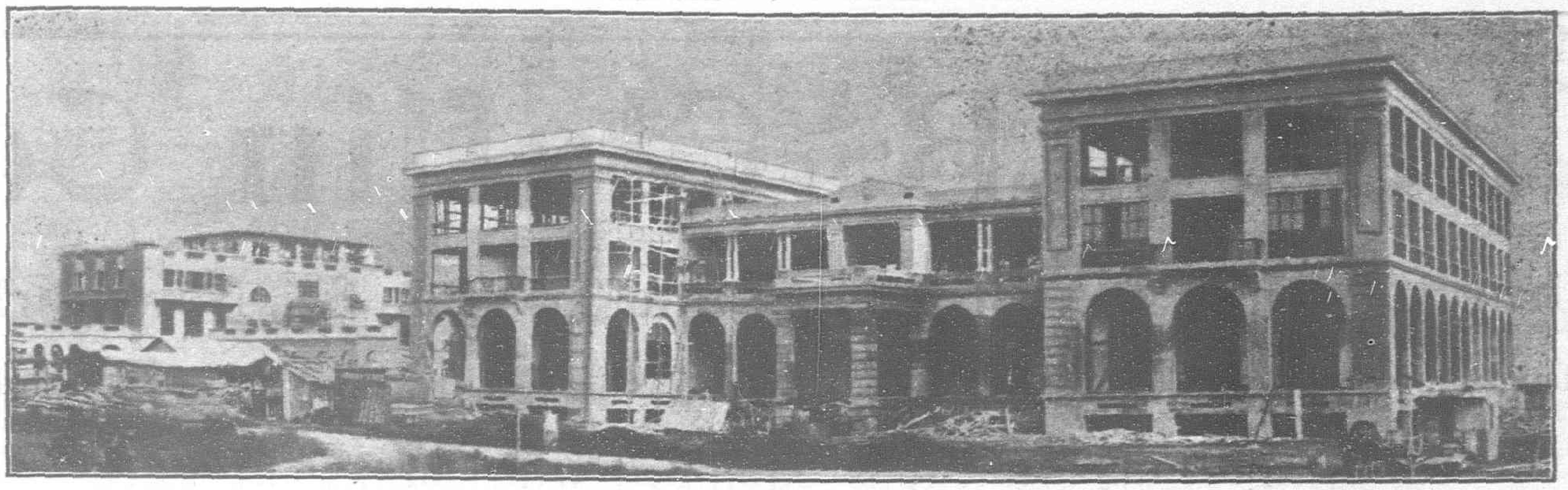

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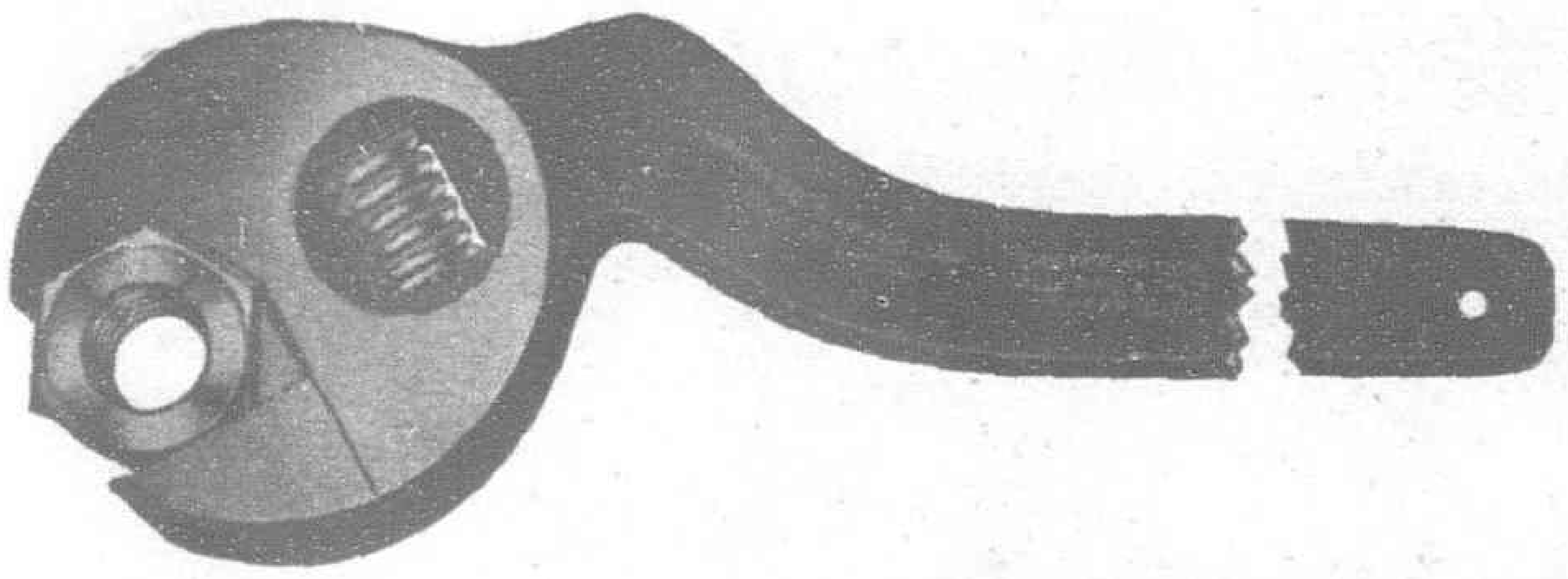

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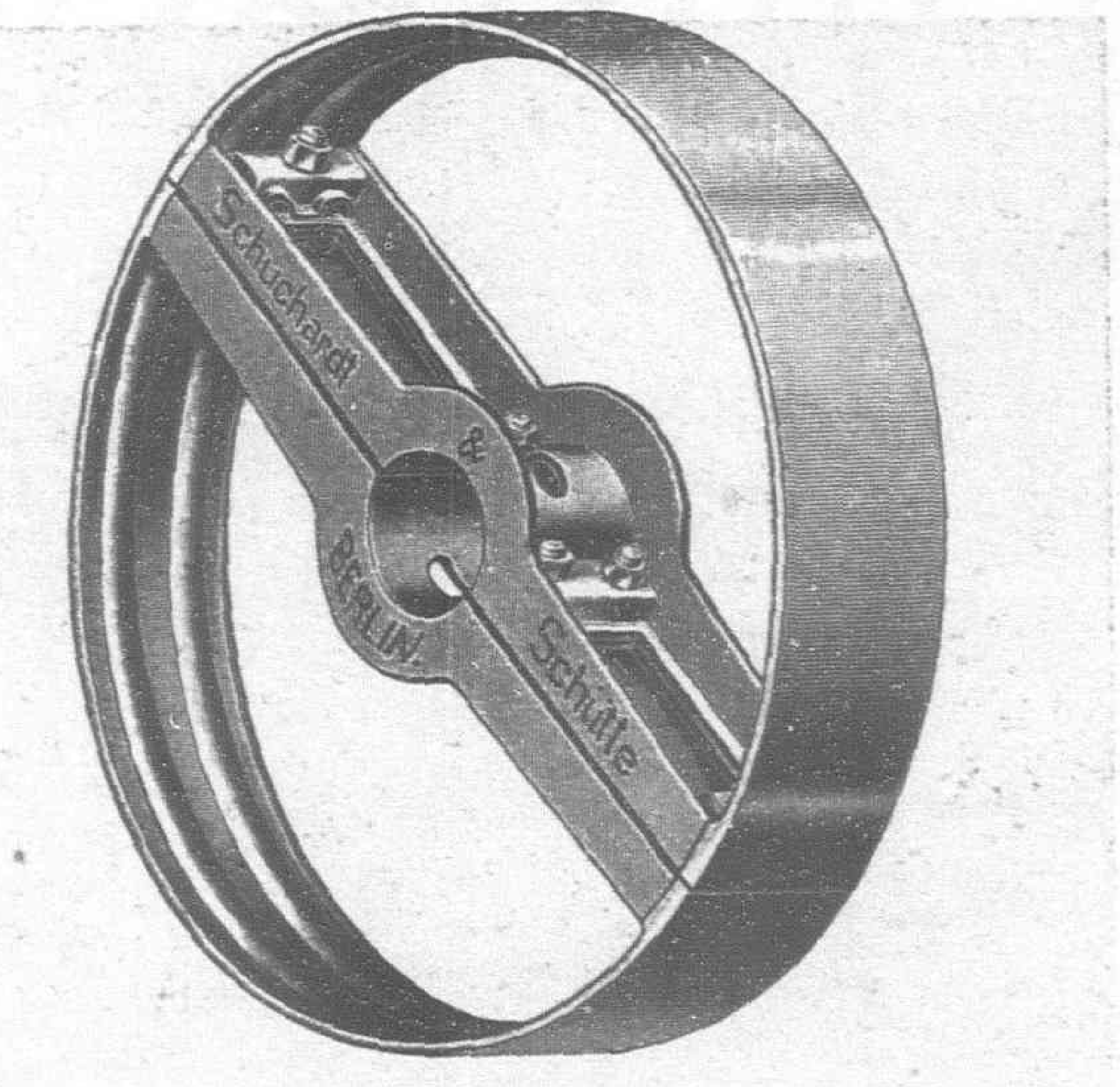

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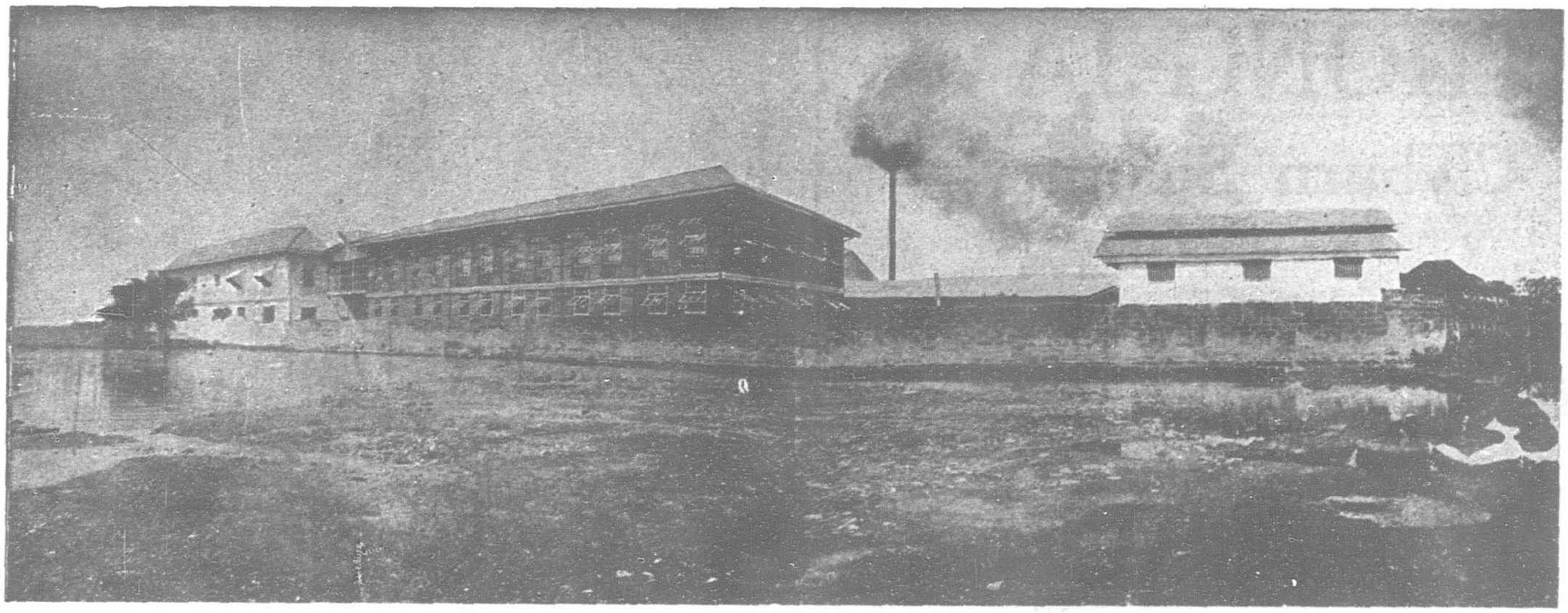

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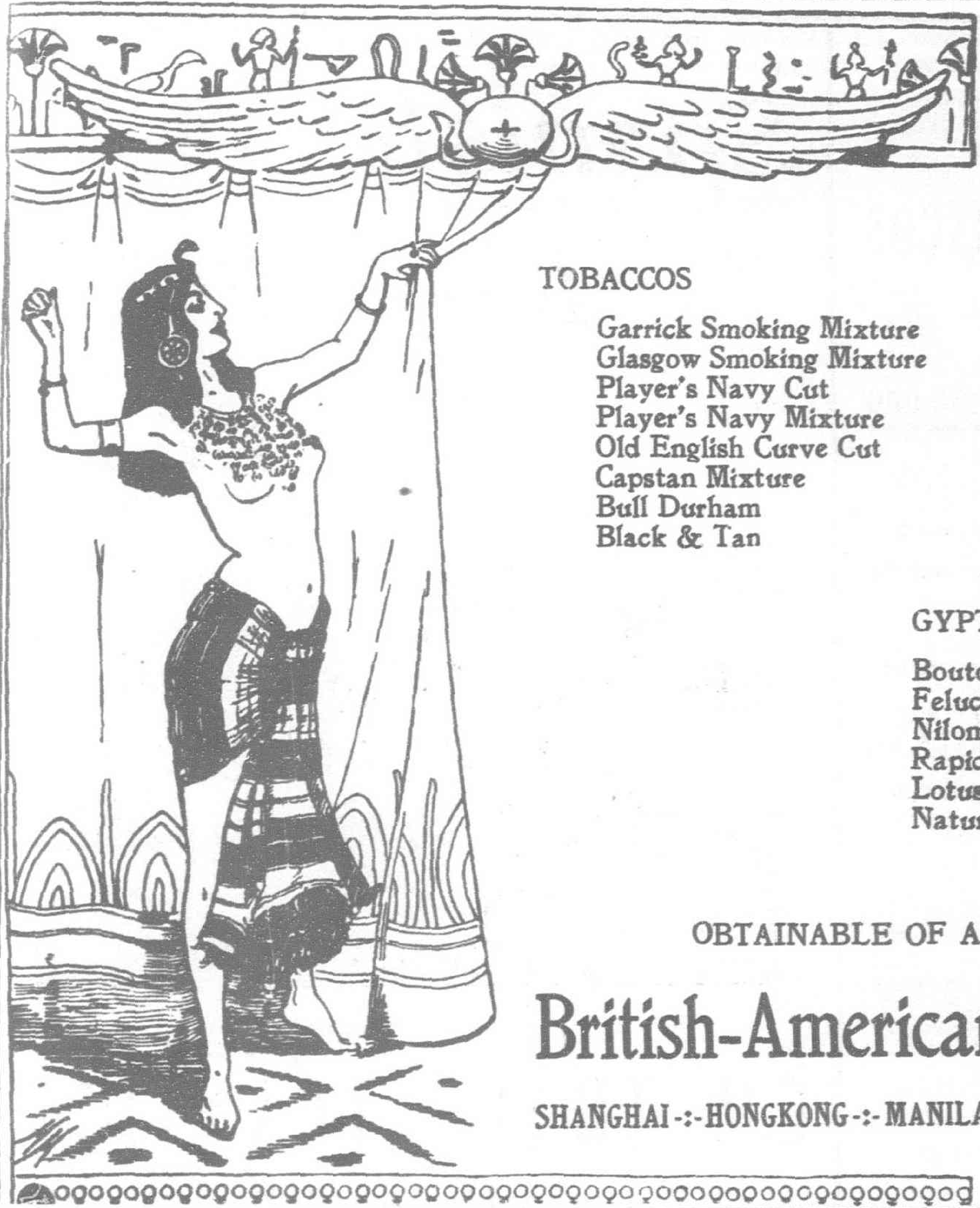

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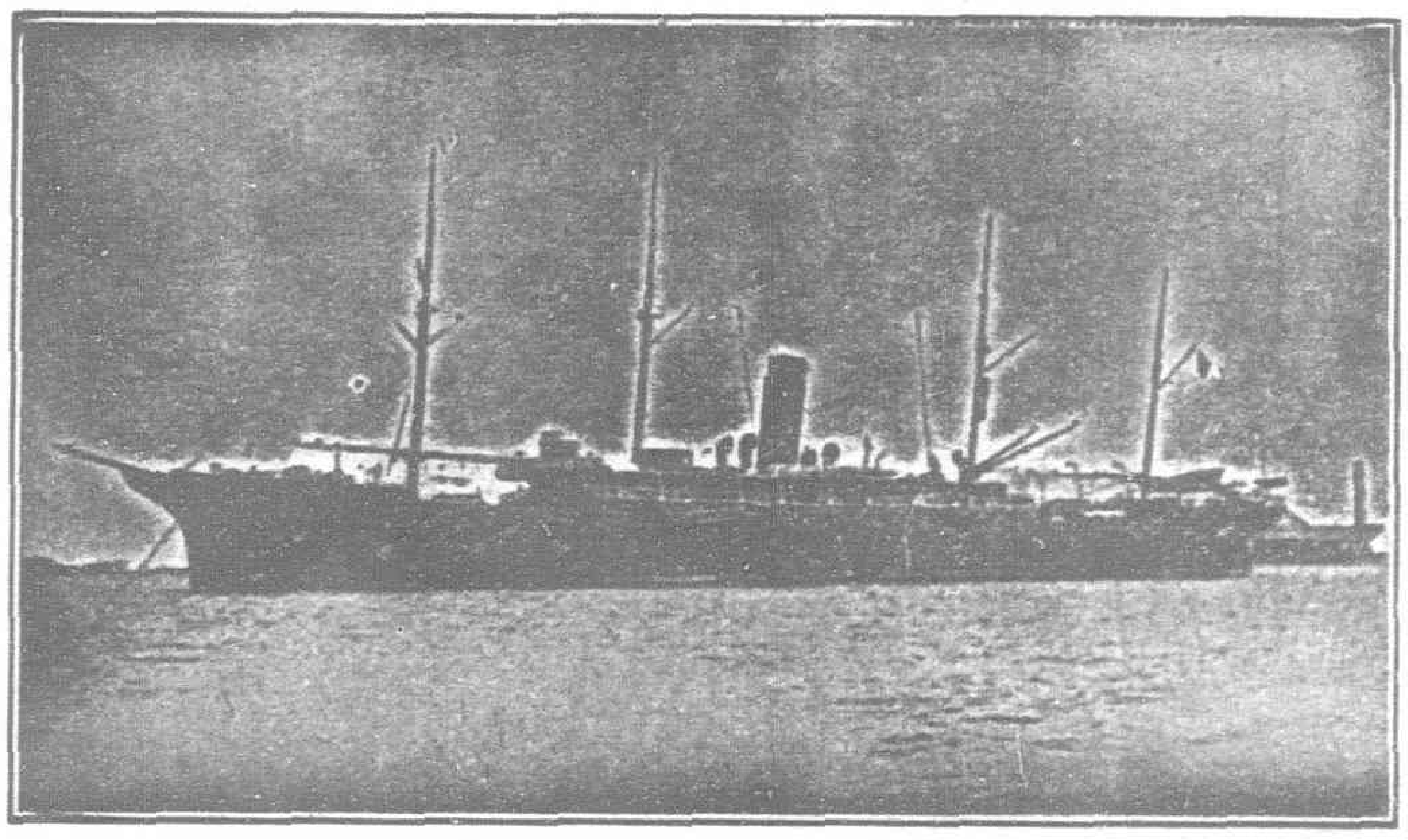

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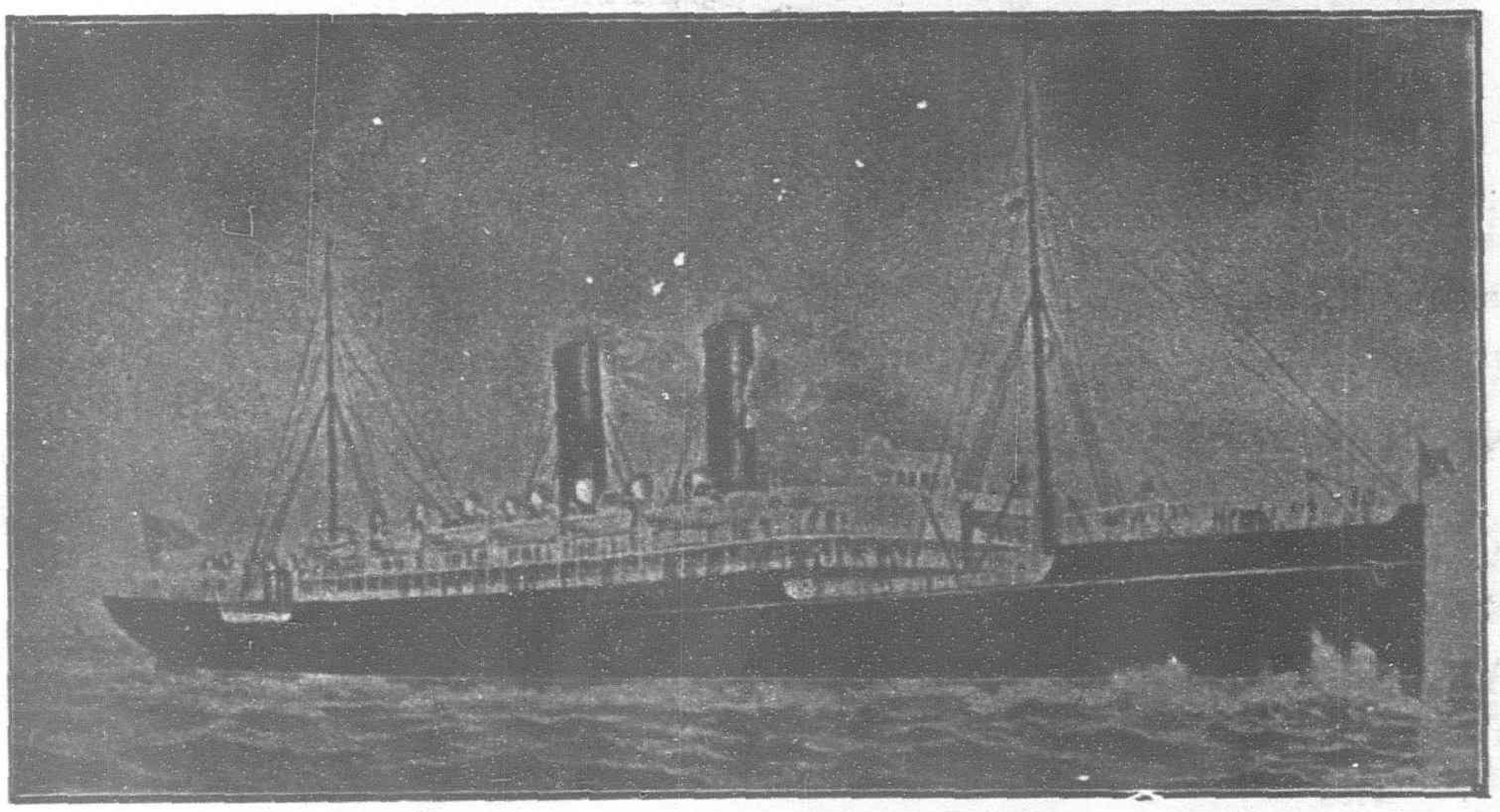

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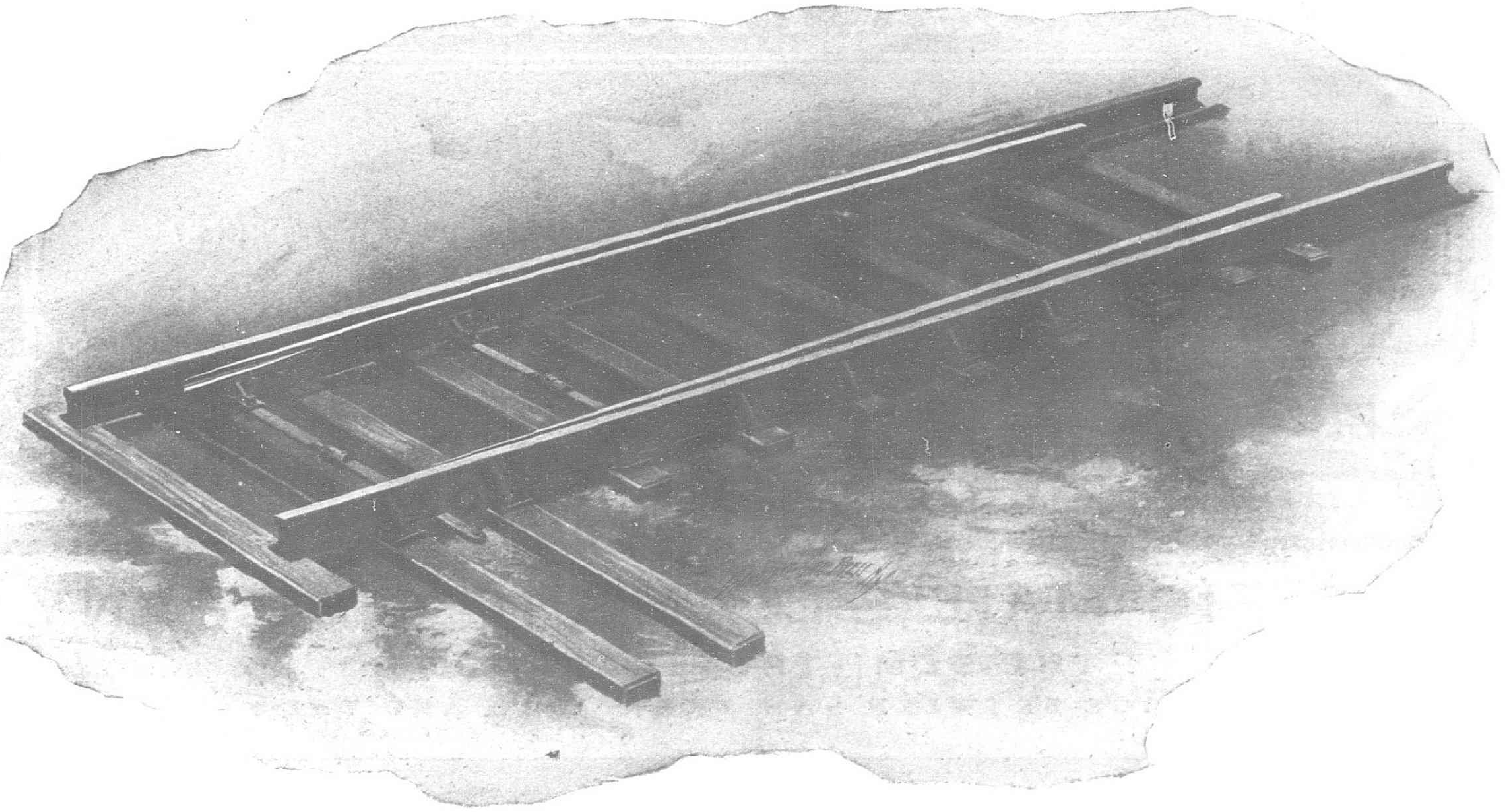

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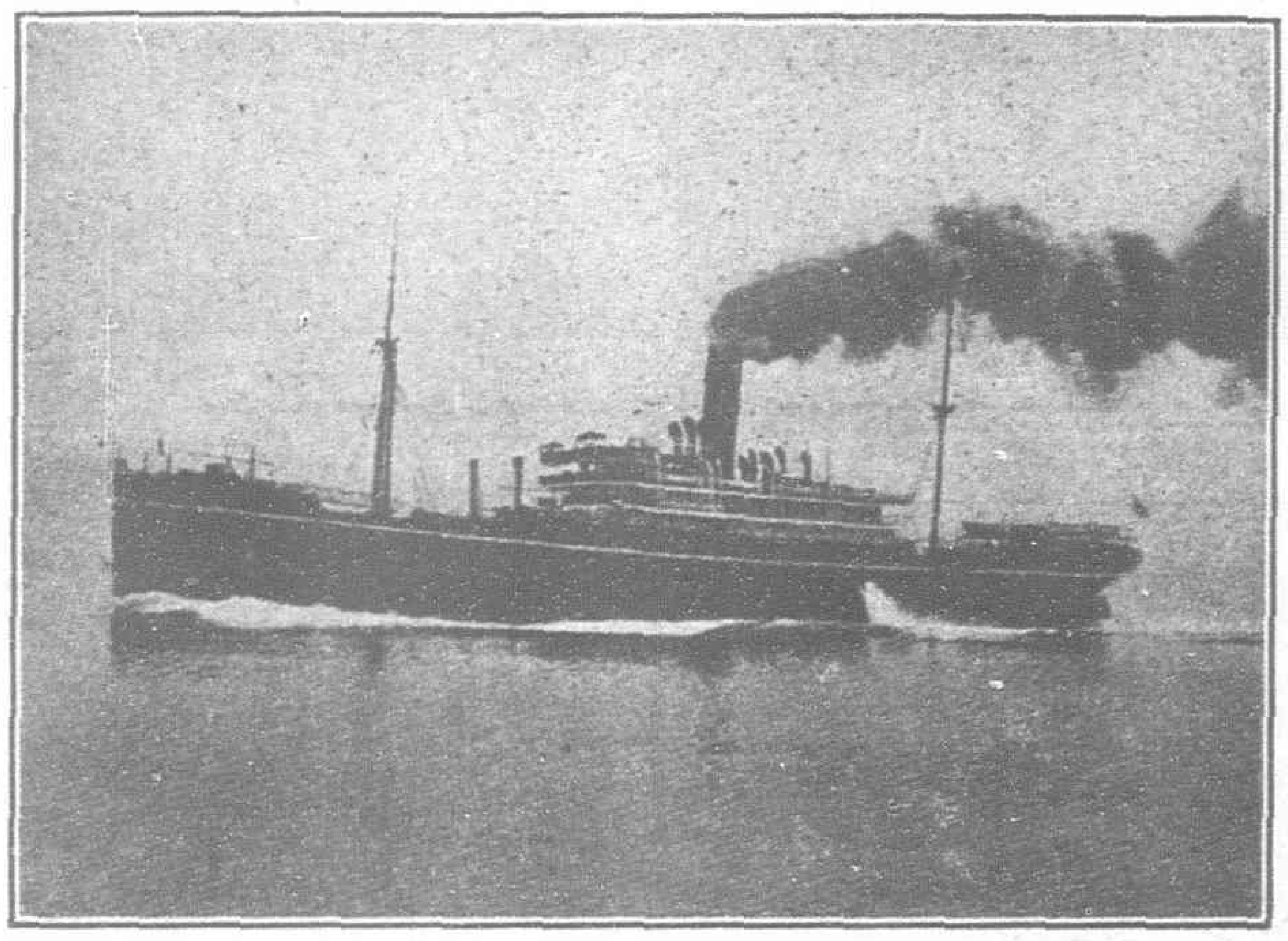

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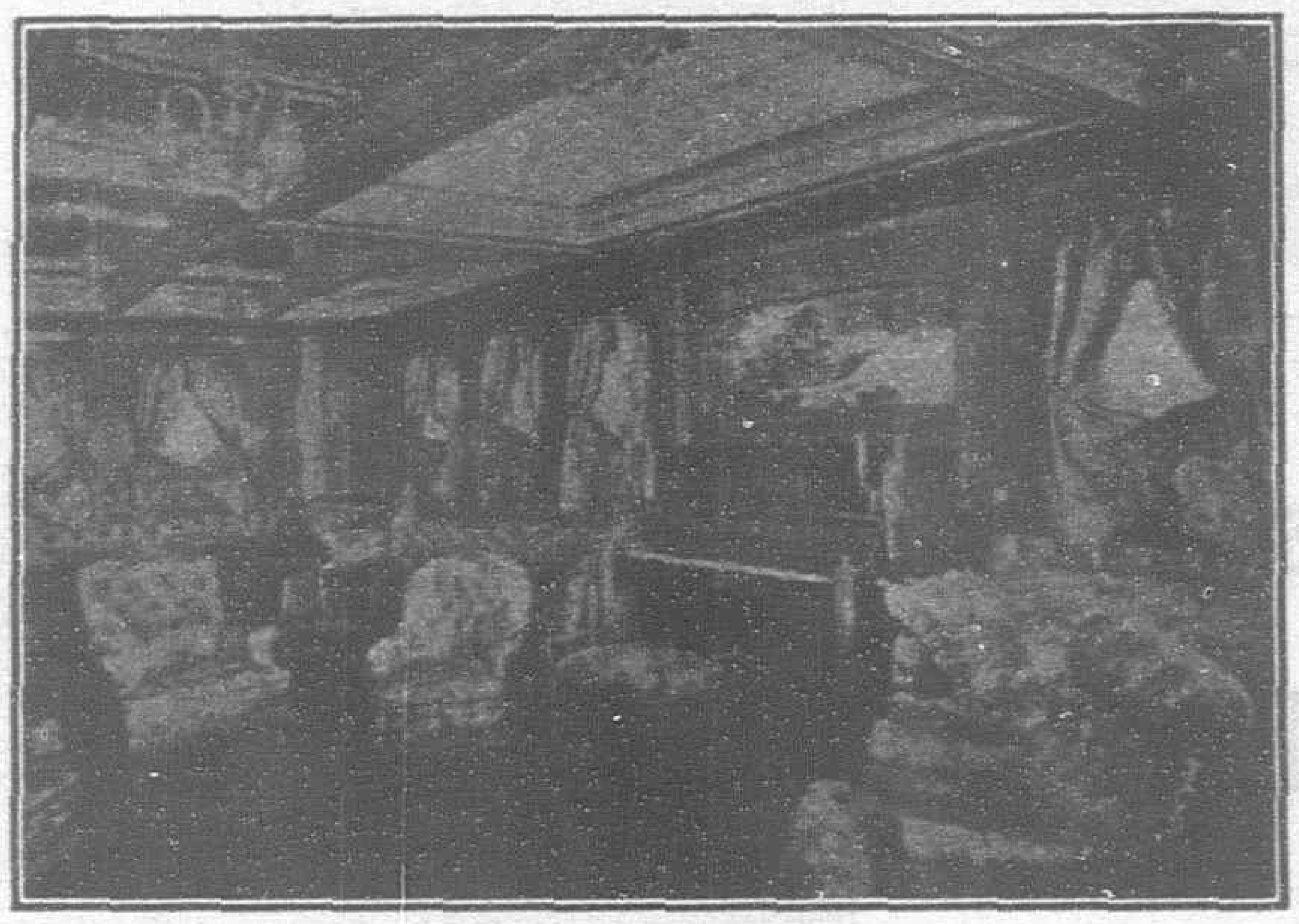

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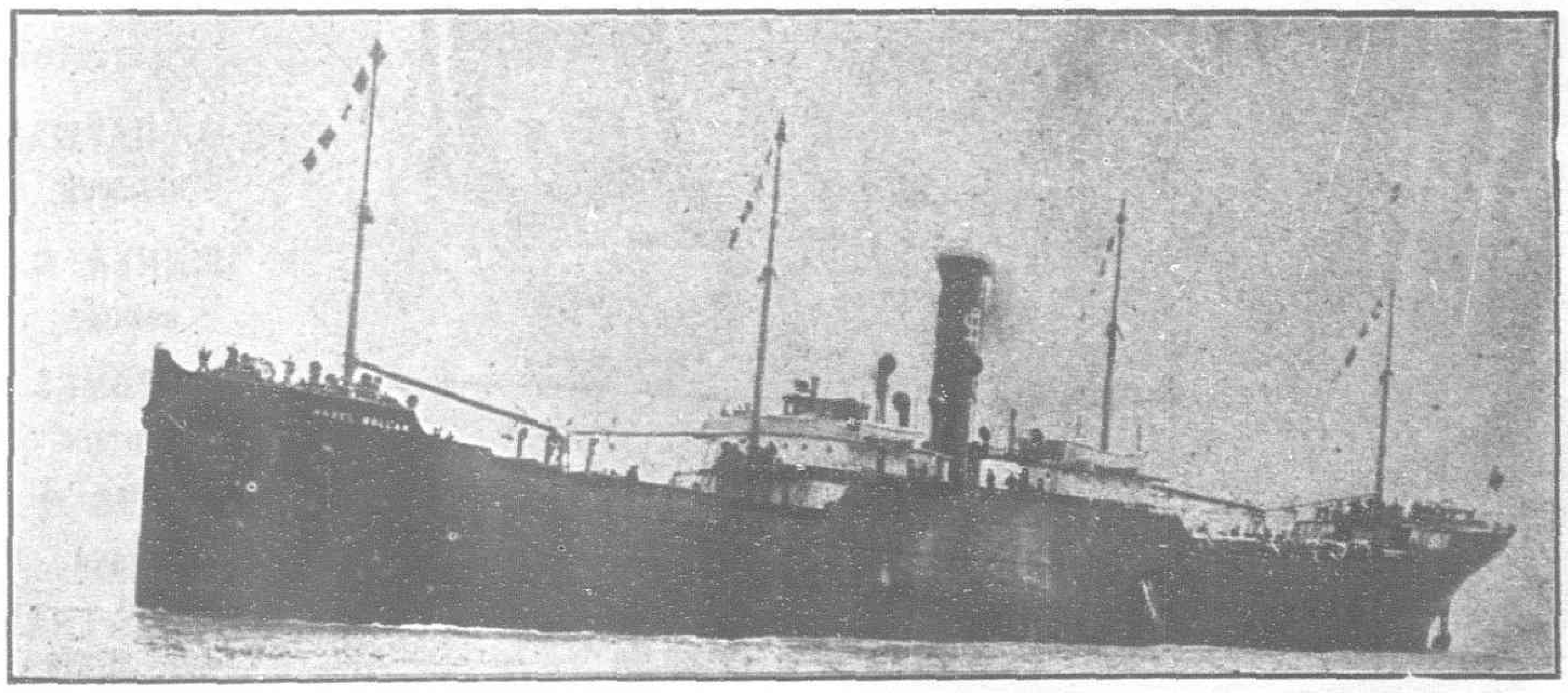

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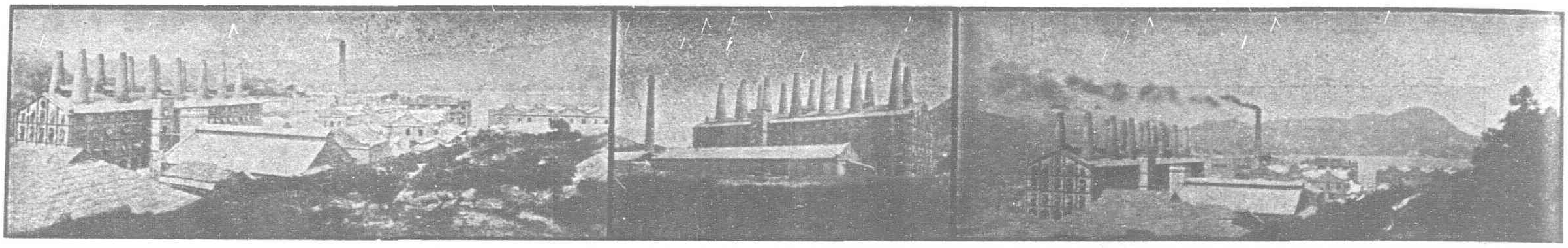

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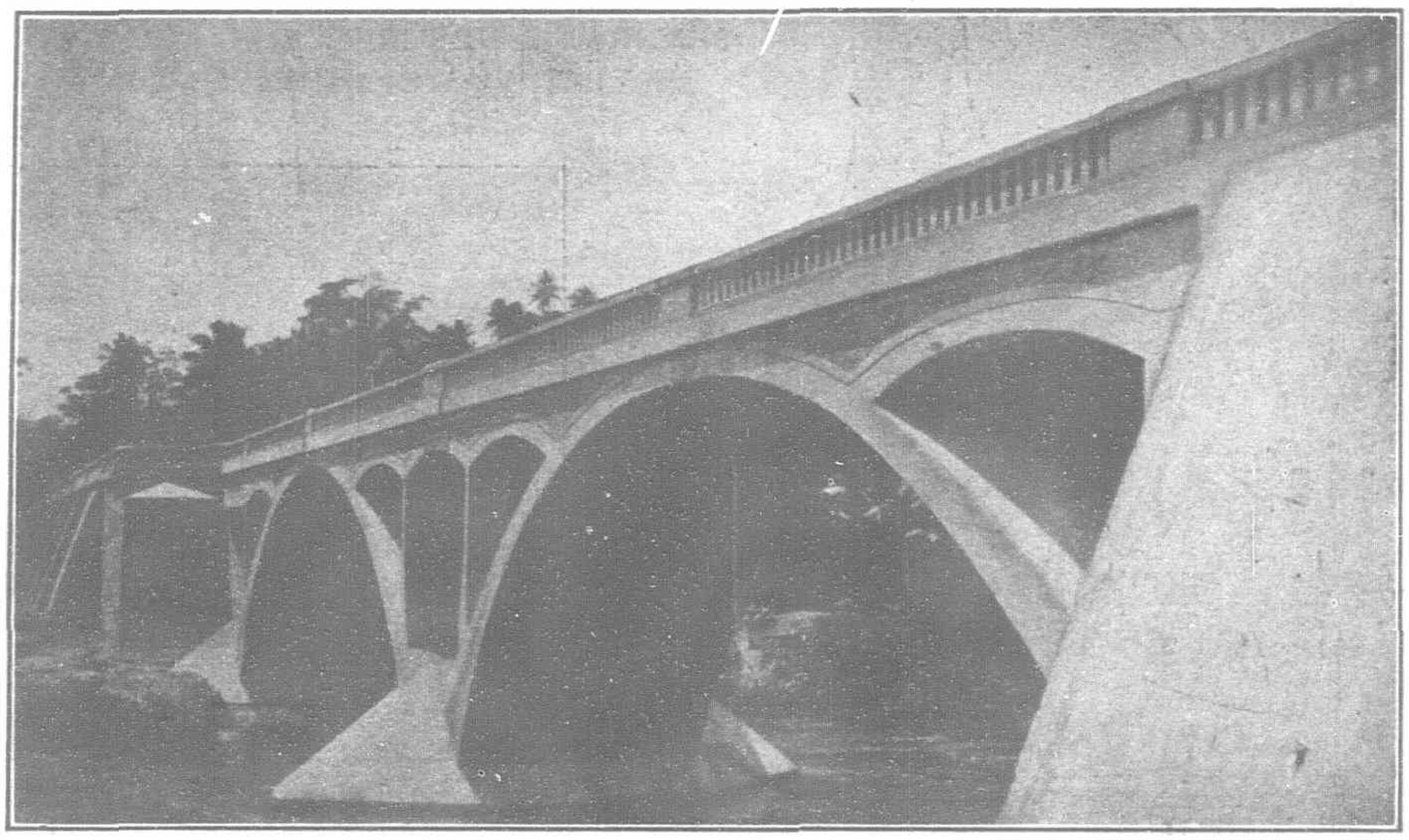

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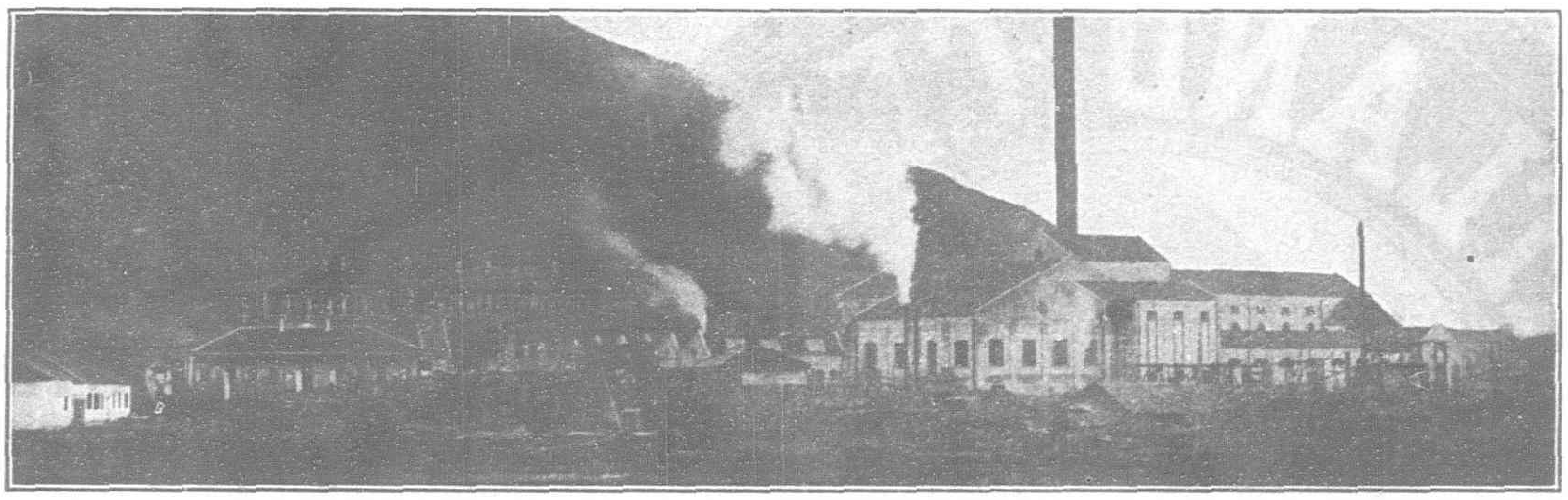

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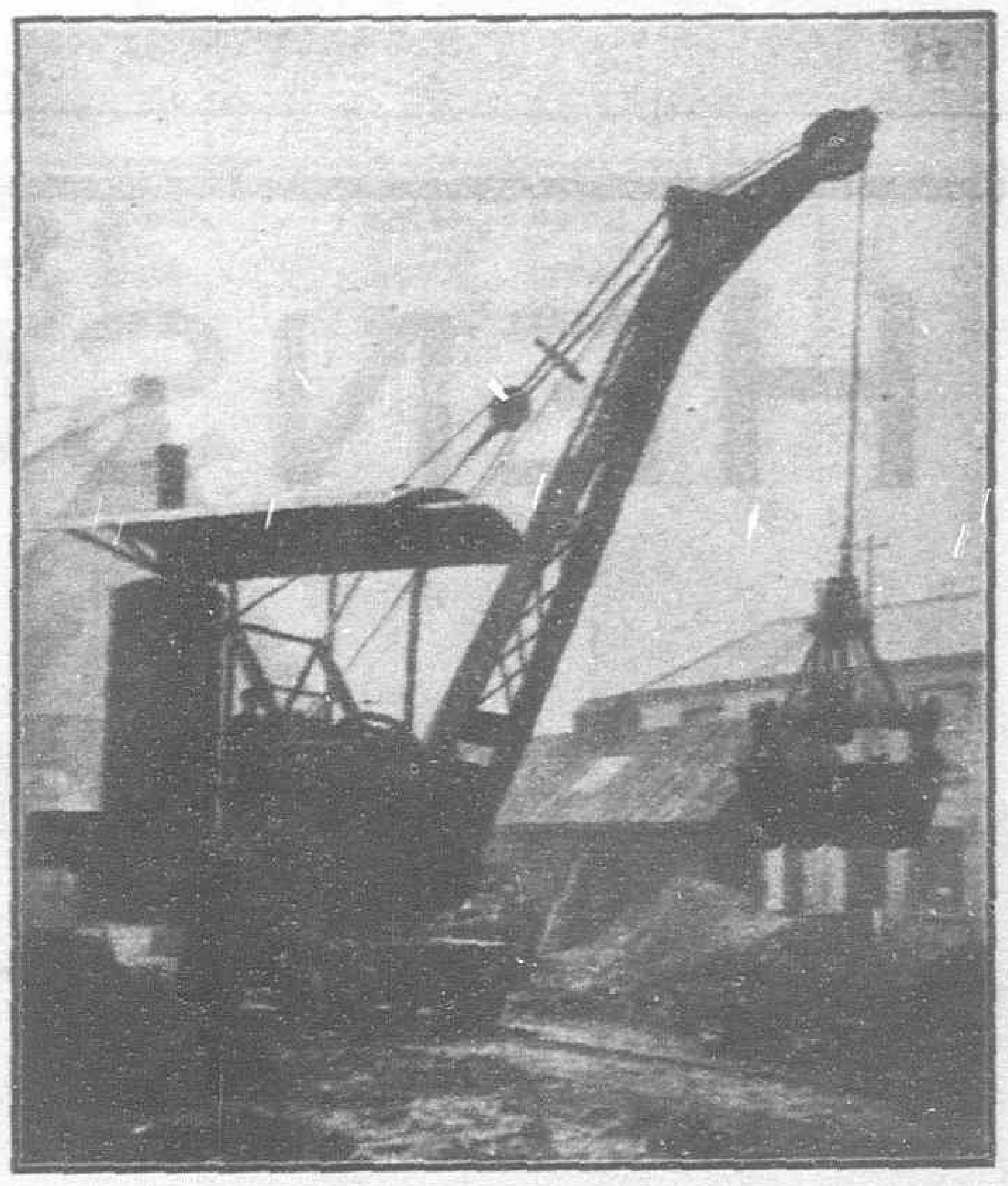

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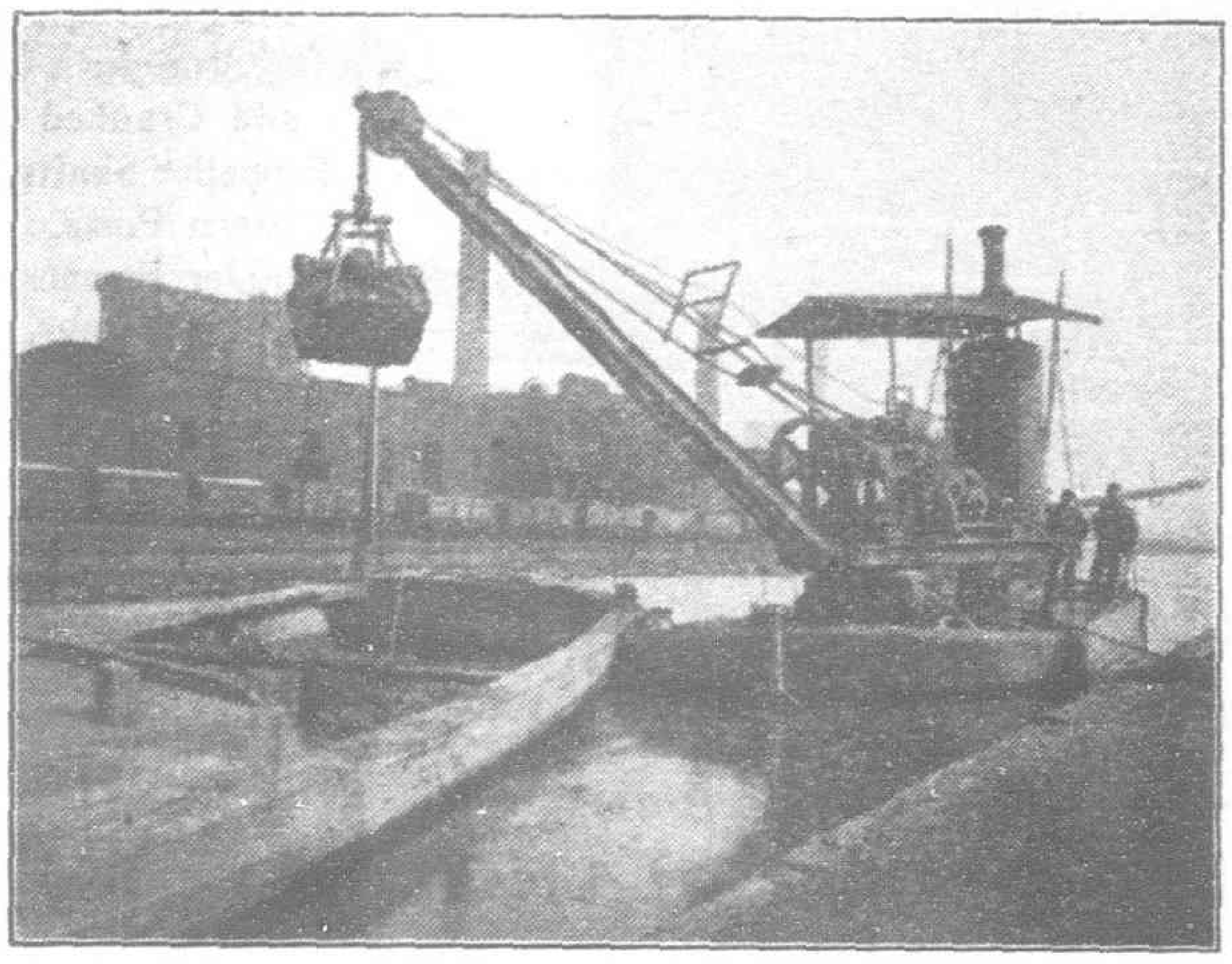

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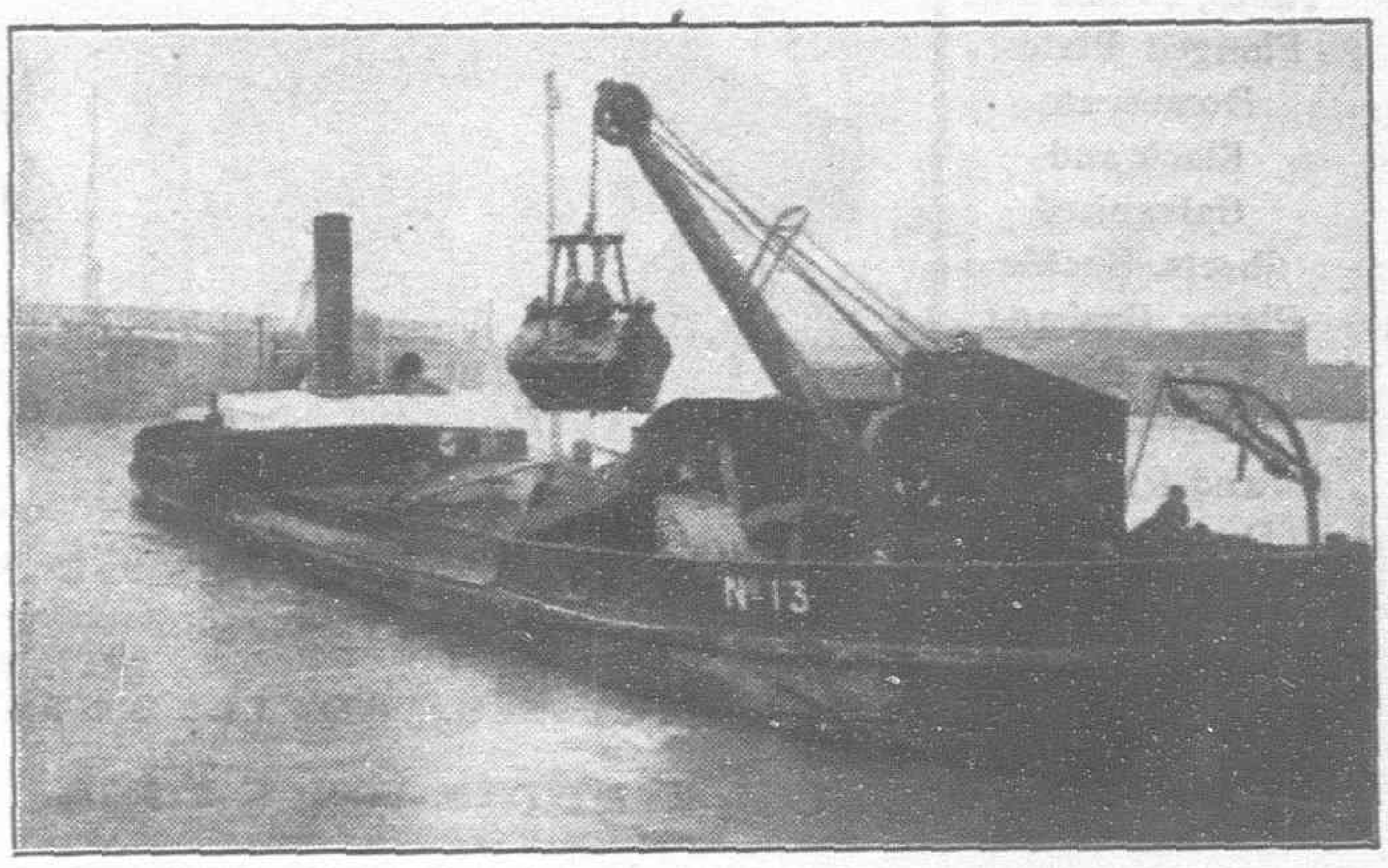

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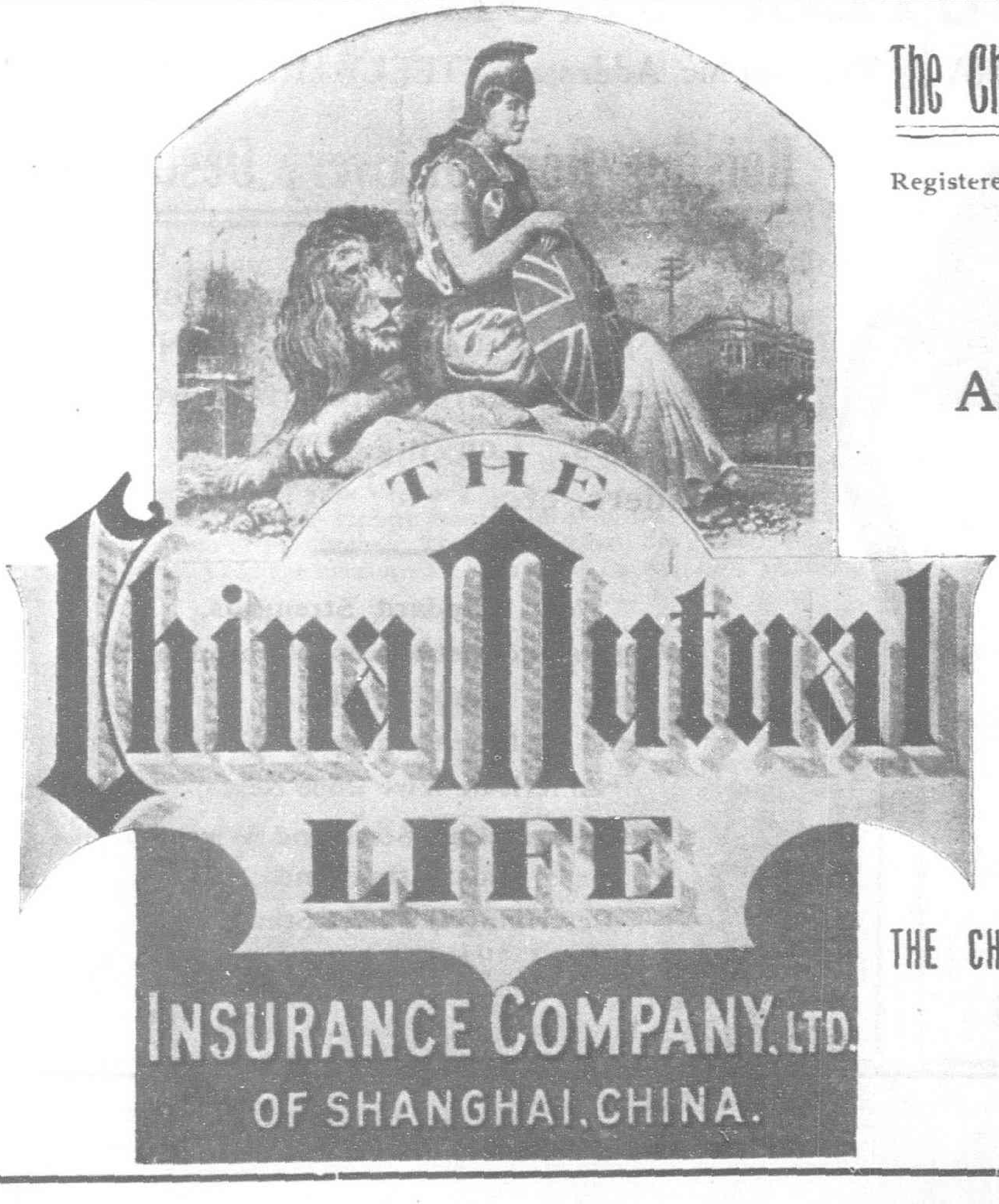

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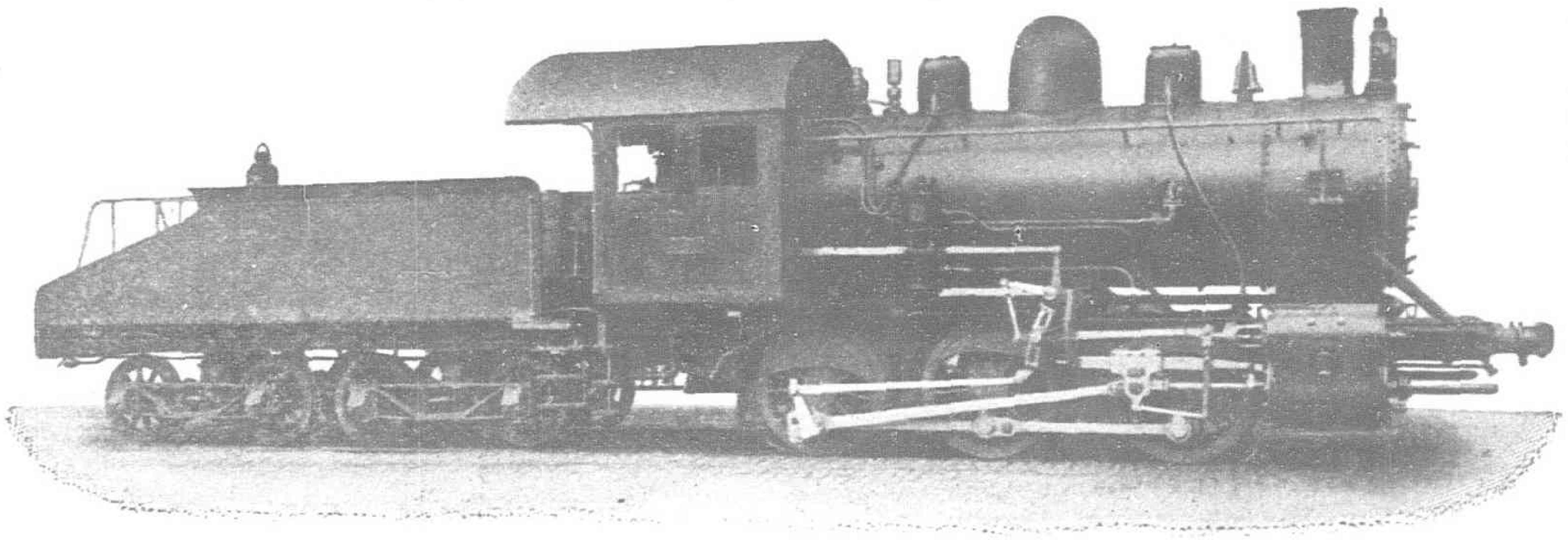

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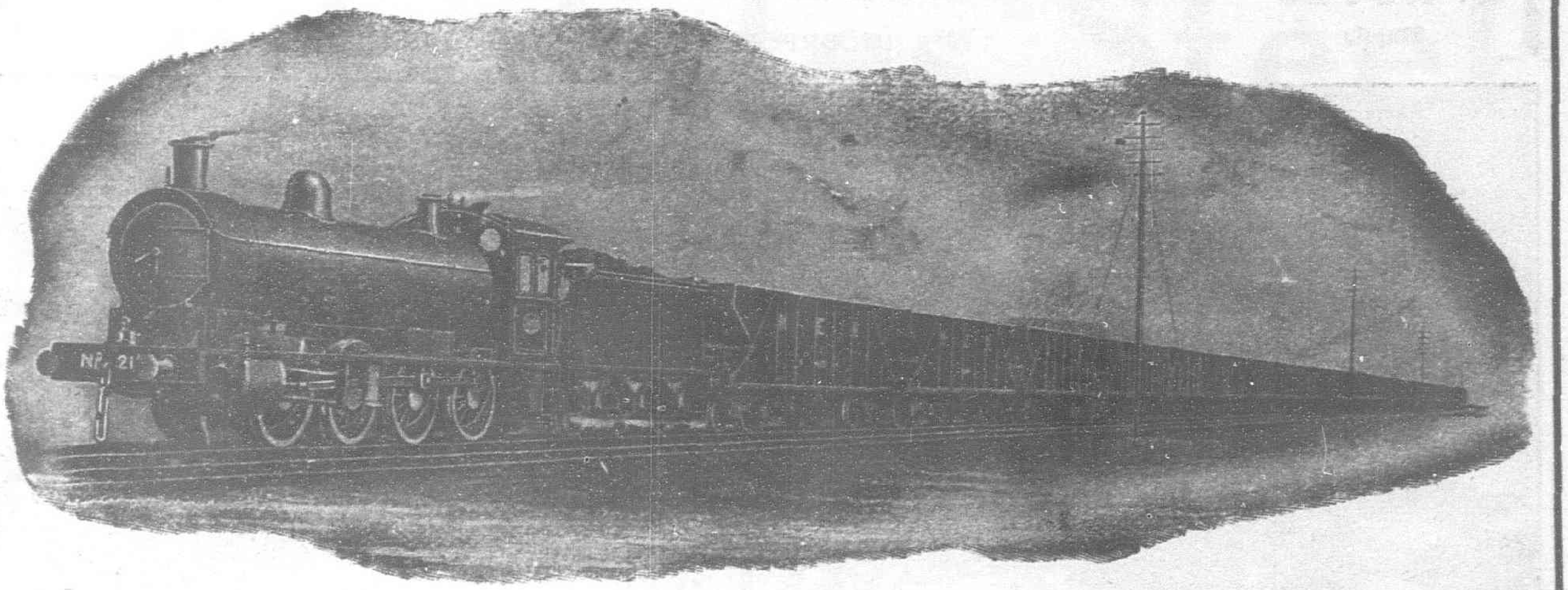

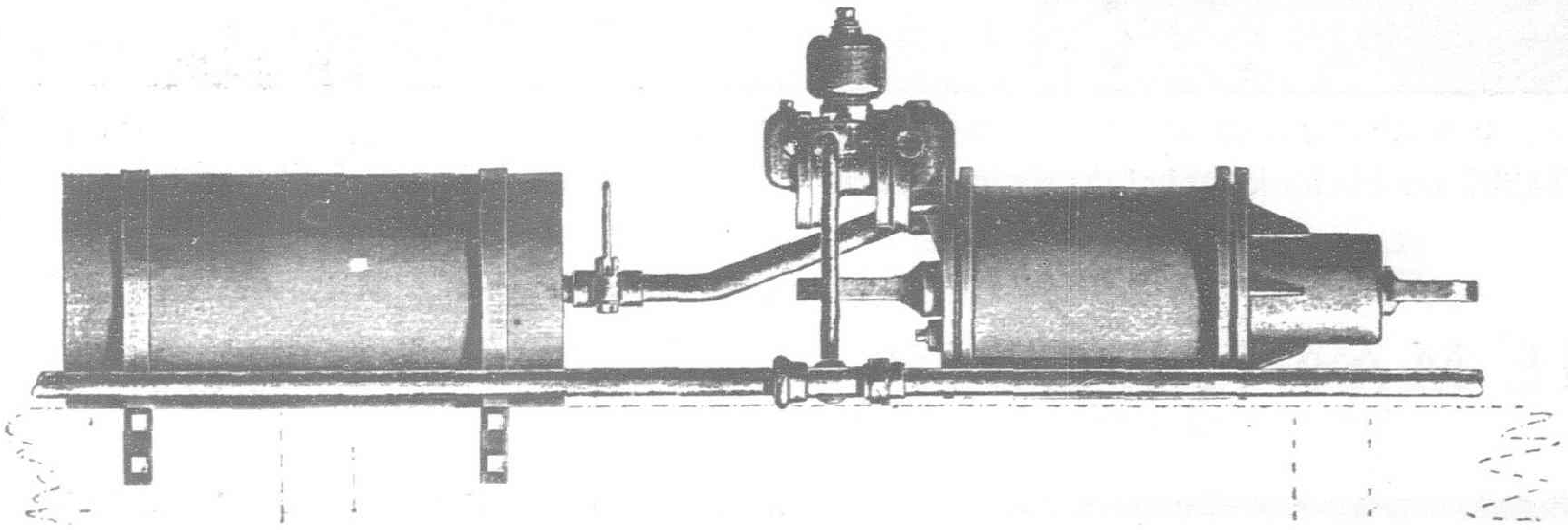

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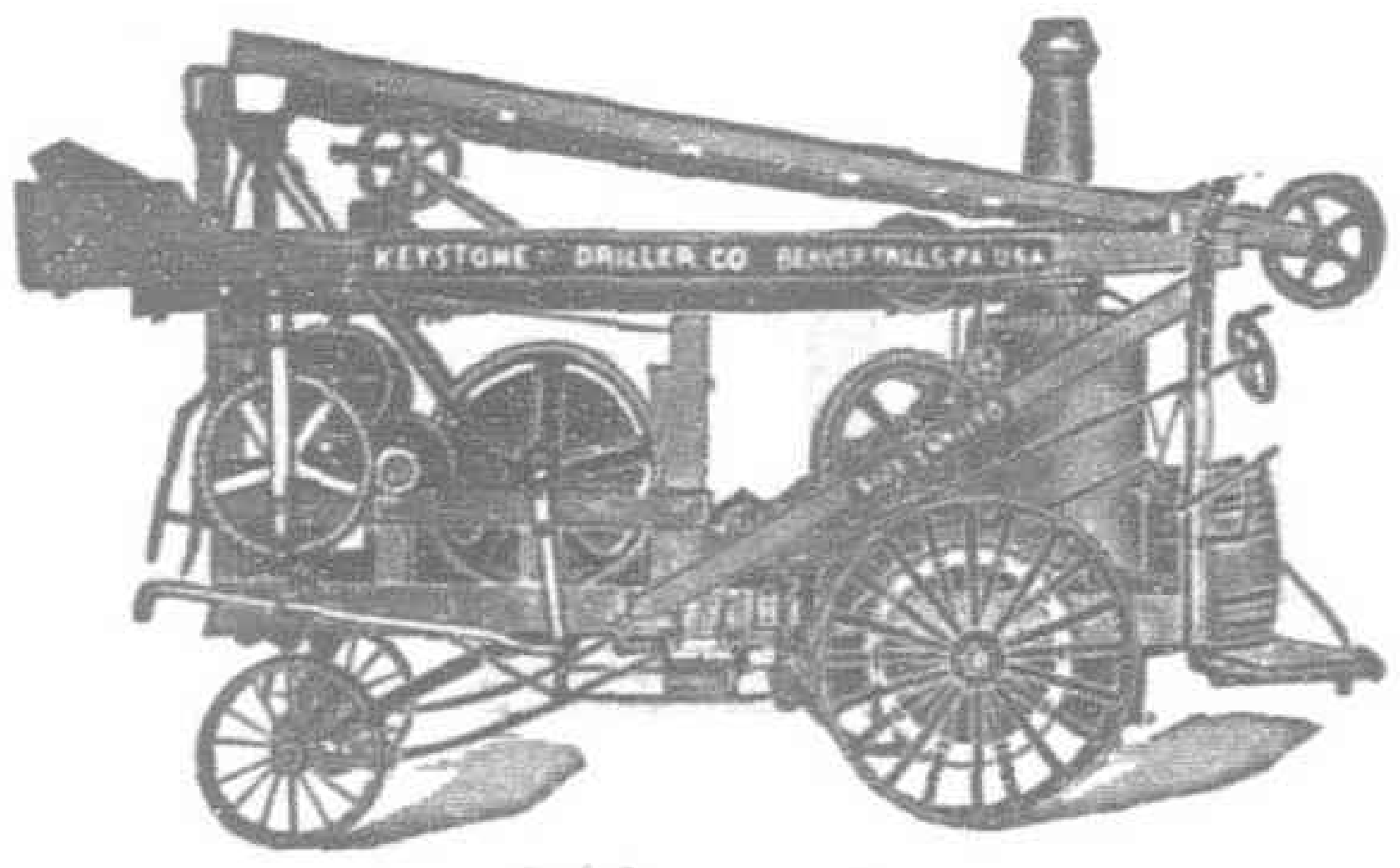
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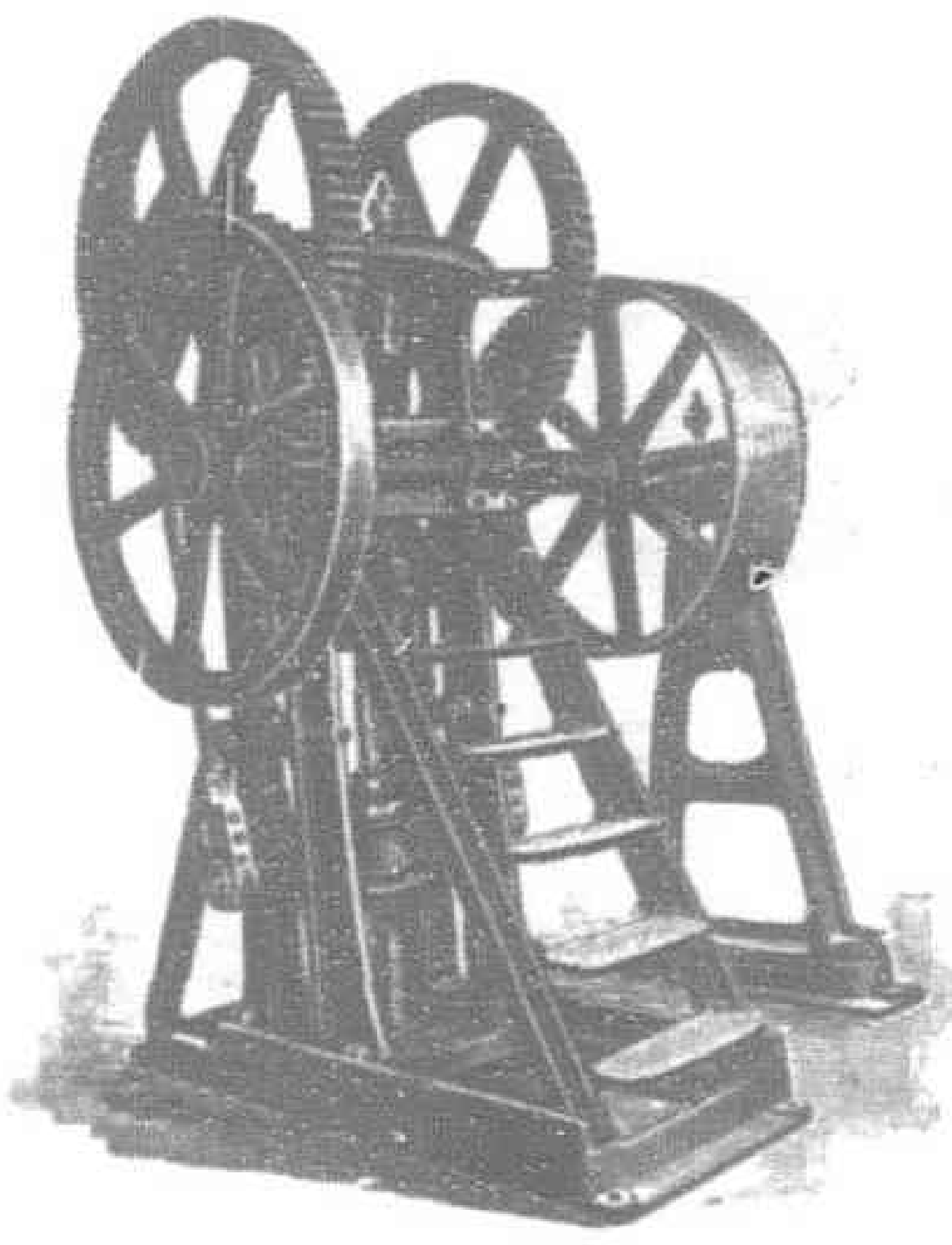

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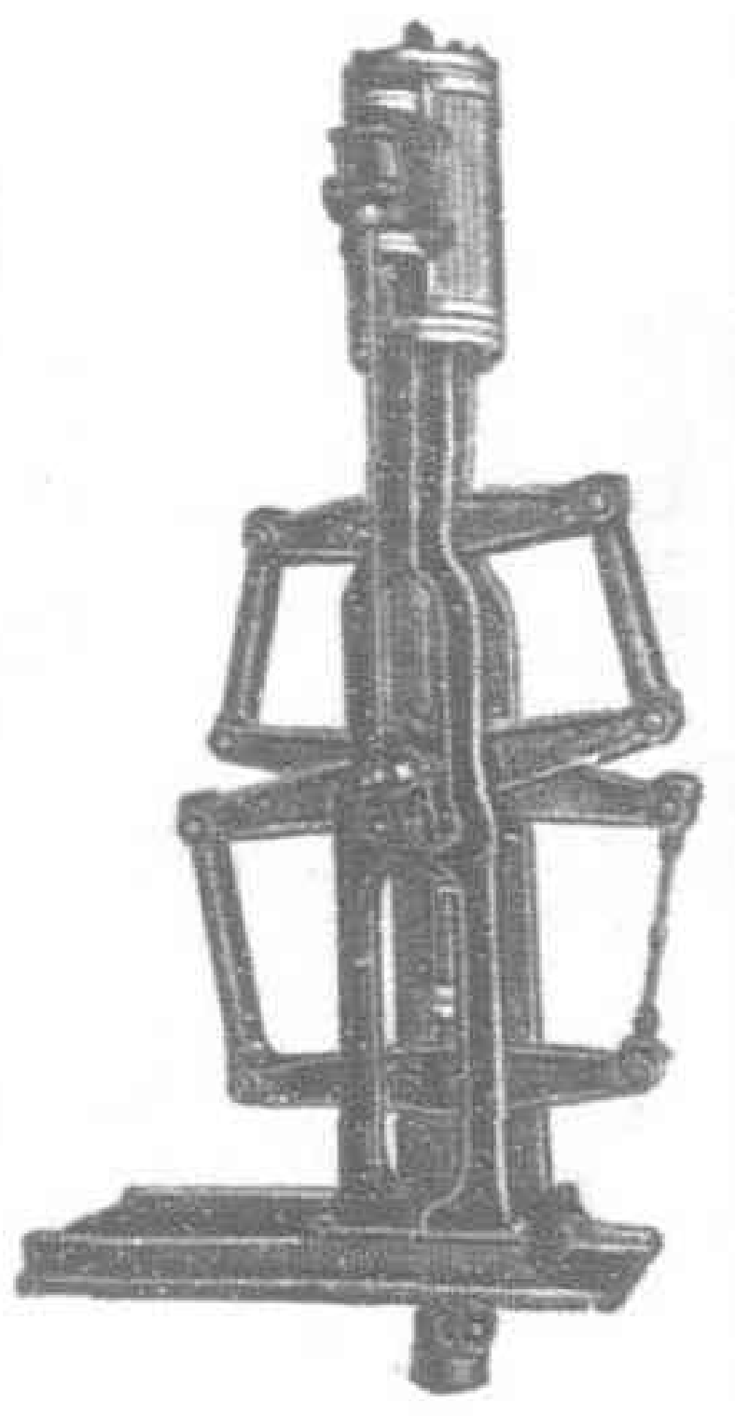

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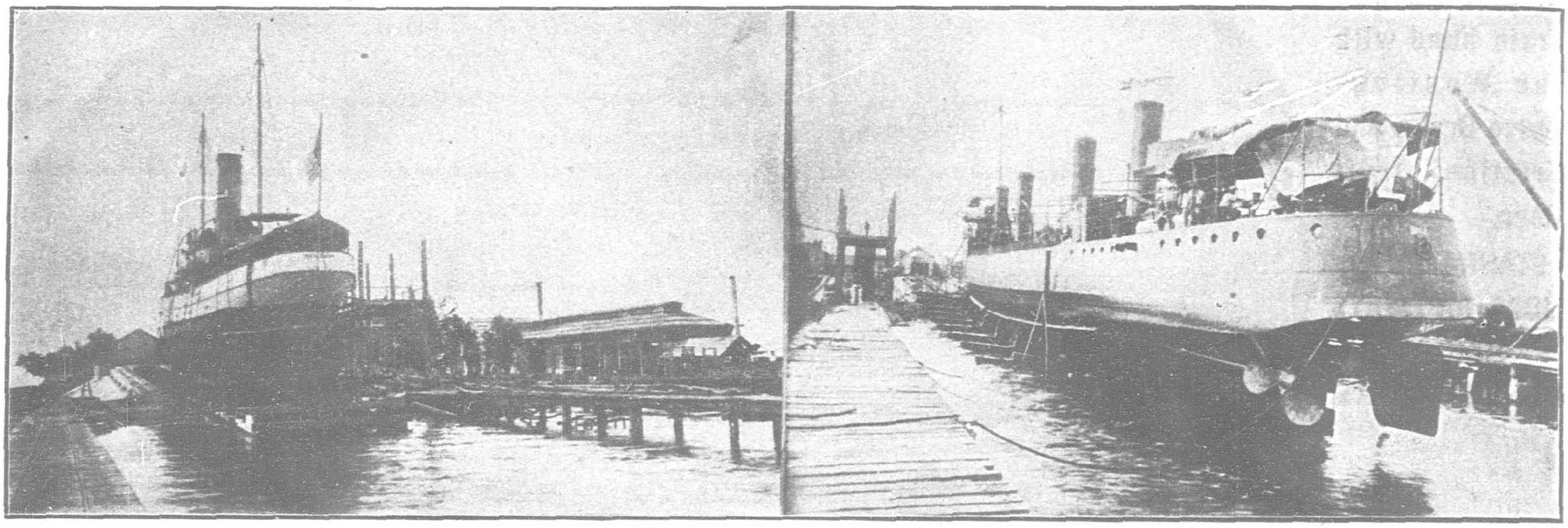

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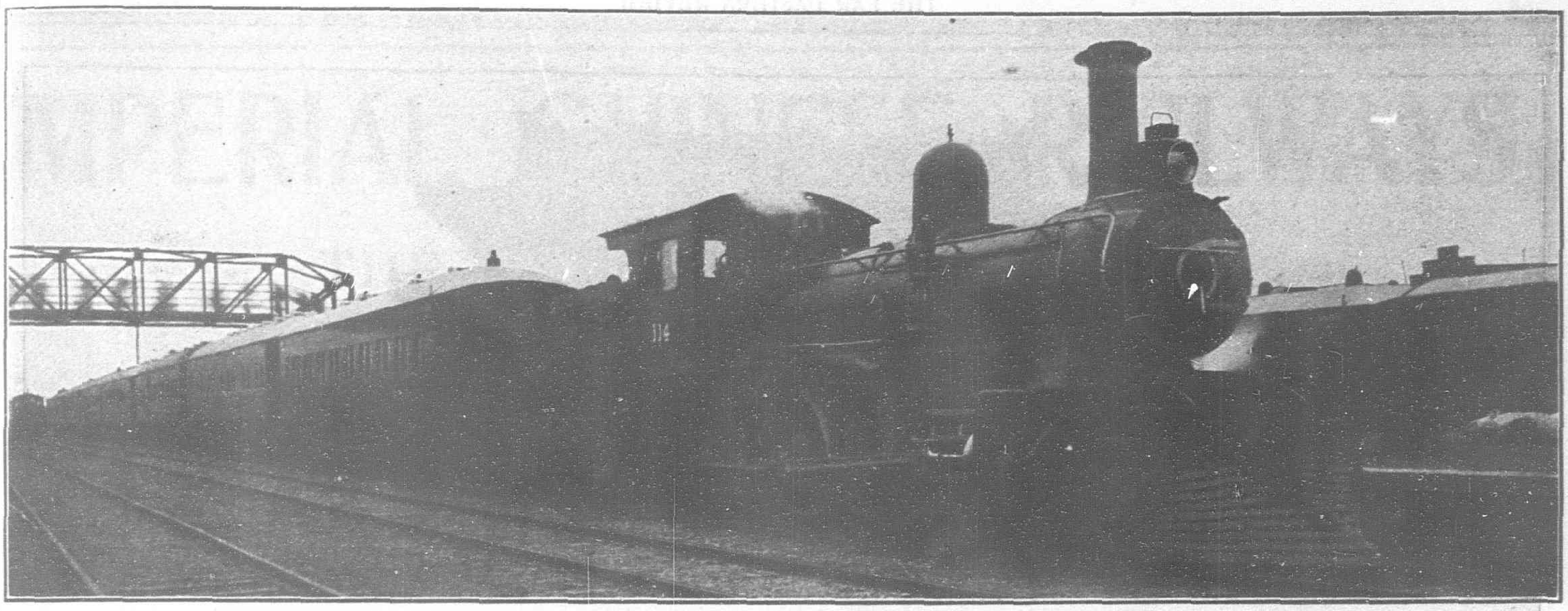

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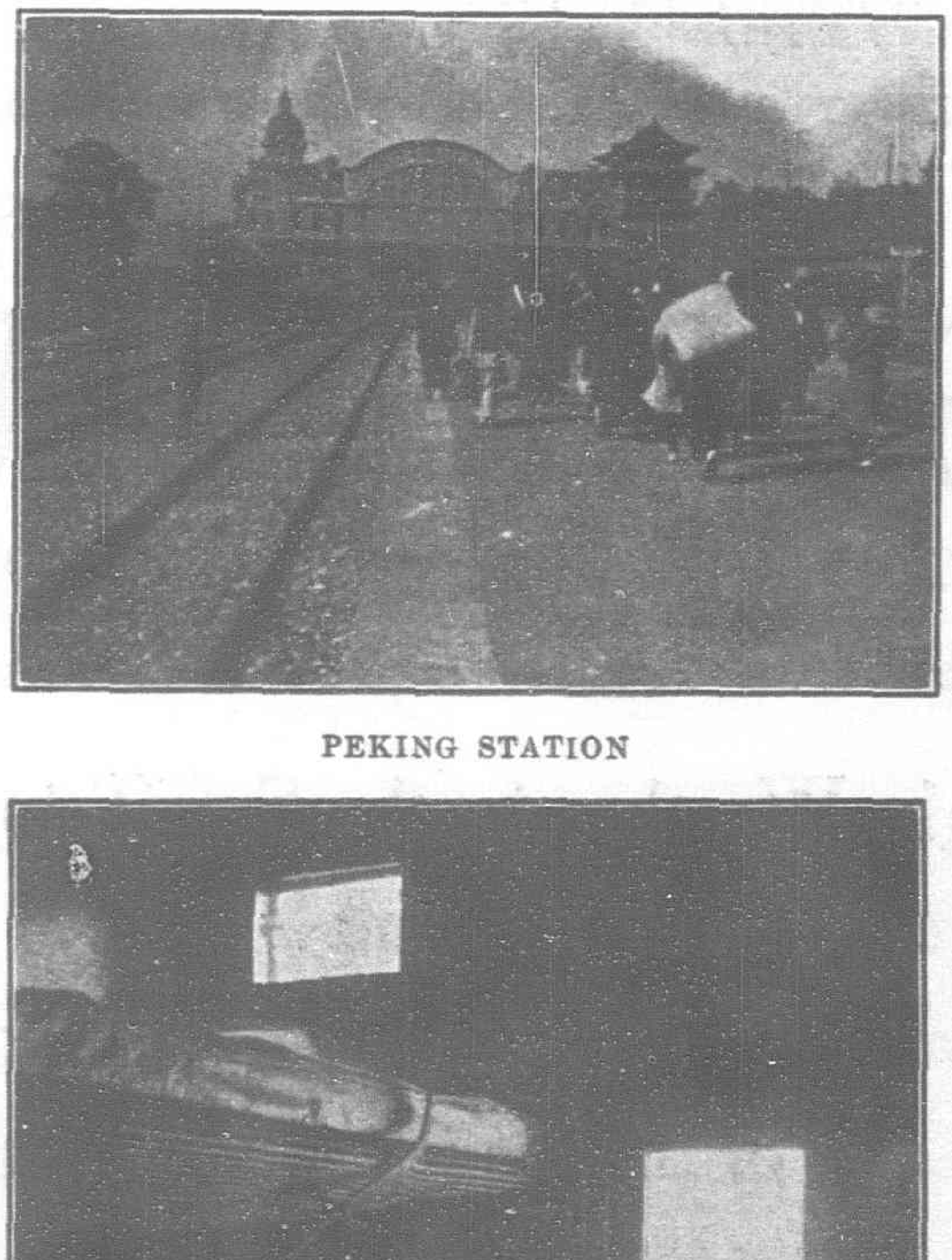

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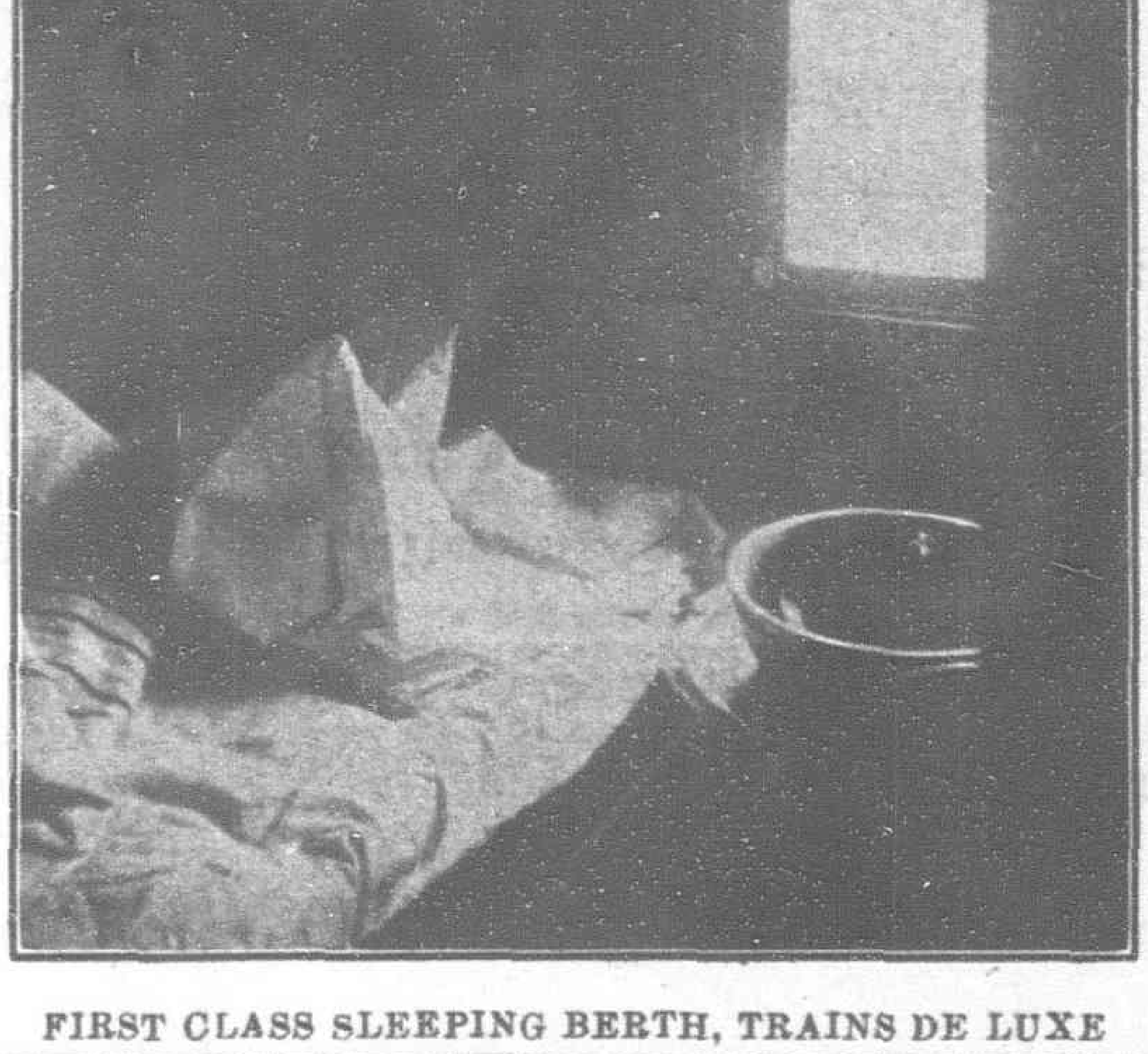

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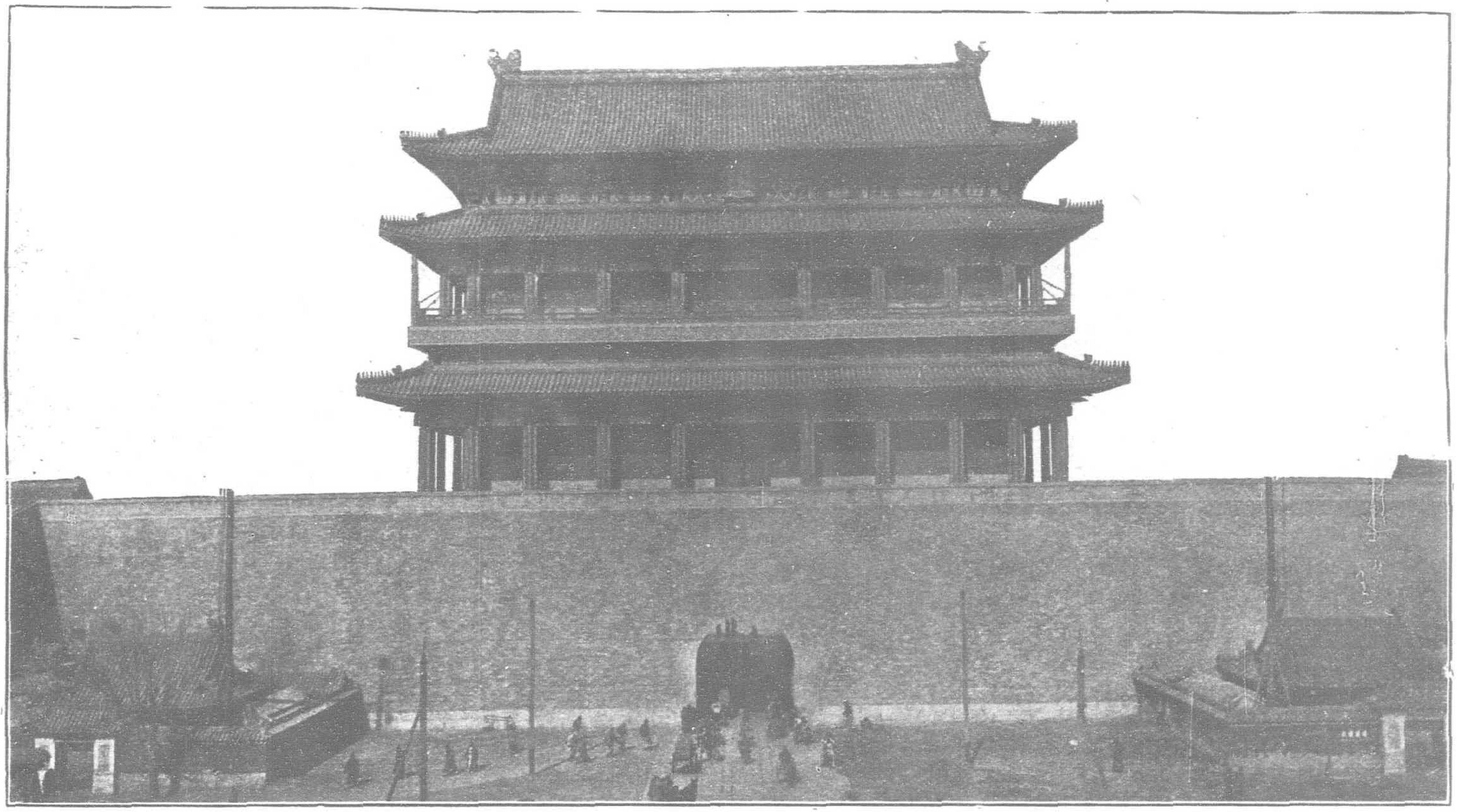

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IMPERIAL CHINESE RAILWAYS

THE TAO-CHING RAILWAY

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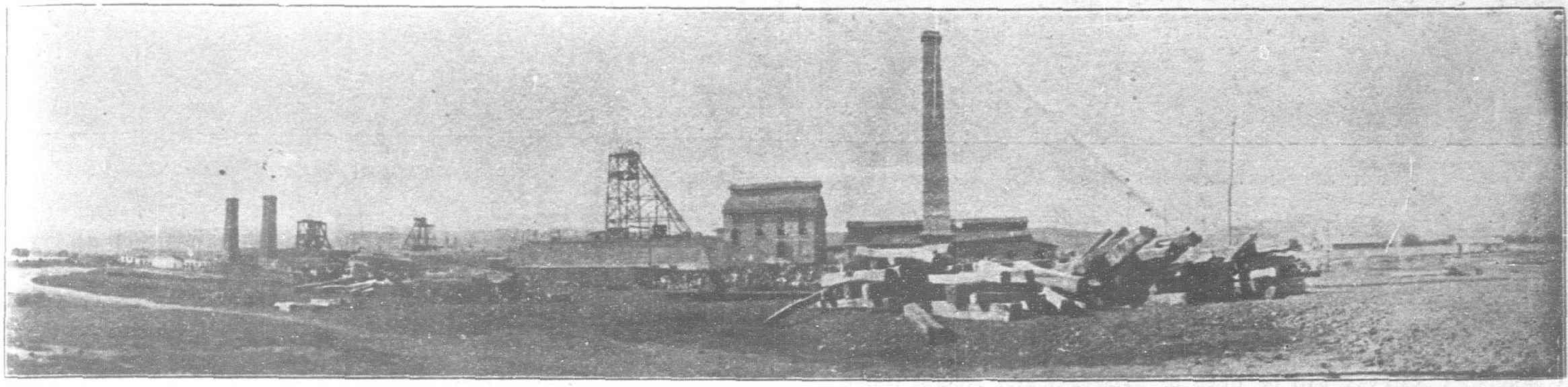
(Imperial Chinese Government Honan Line)



GENERAL VIEW OF COAL MINES ON THE LINE OF THE TAO-CHING RAILWAY

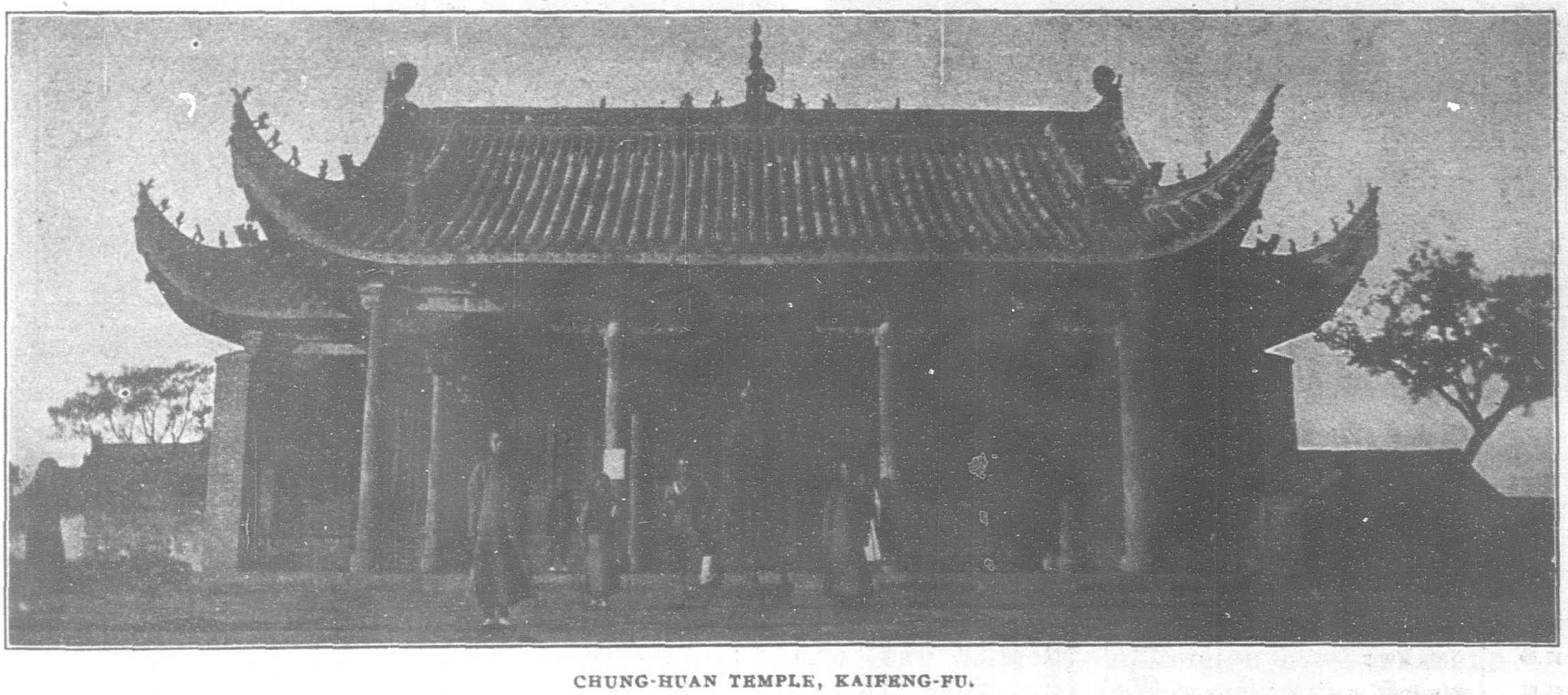
"China's Road of Anthracite"

THE TRAINS OF THIS LINE CONNECT AT SIN-SIANG-SIEN WITH THE THROUGH SERVICE OF THE PEKING-HANKOW RAILWAY. IT TAPS THE GREAT ANTHRACITE COAL DEPOSITS OF SHANSI, AND CONVEYS THE PRODUCTS OF THE MINES TO THE NEAREST NAVIGABLE RIVER.

THE PIENLO RAILWAY

(KAIFENG-FU TO HONAN-FU)

"THE FIRST SECTION OF THE PROJECTED CENTRAL TRUNKLINE"

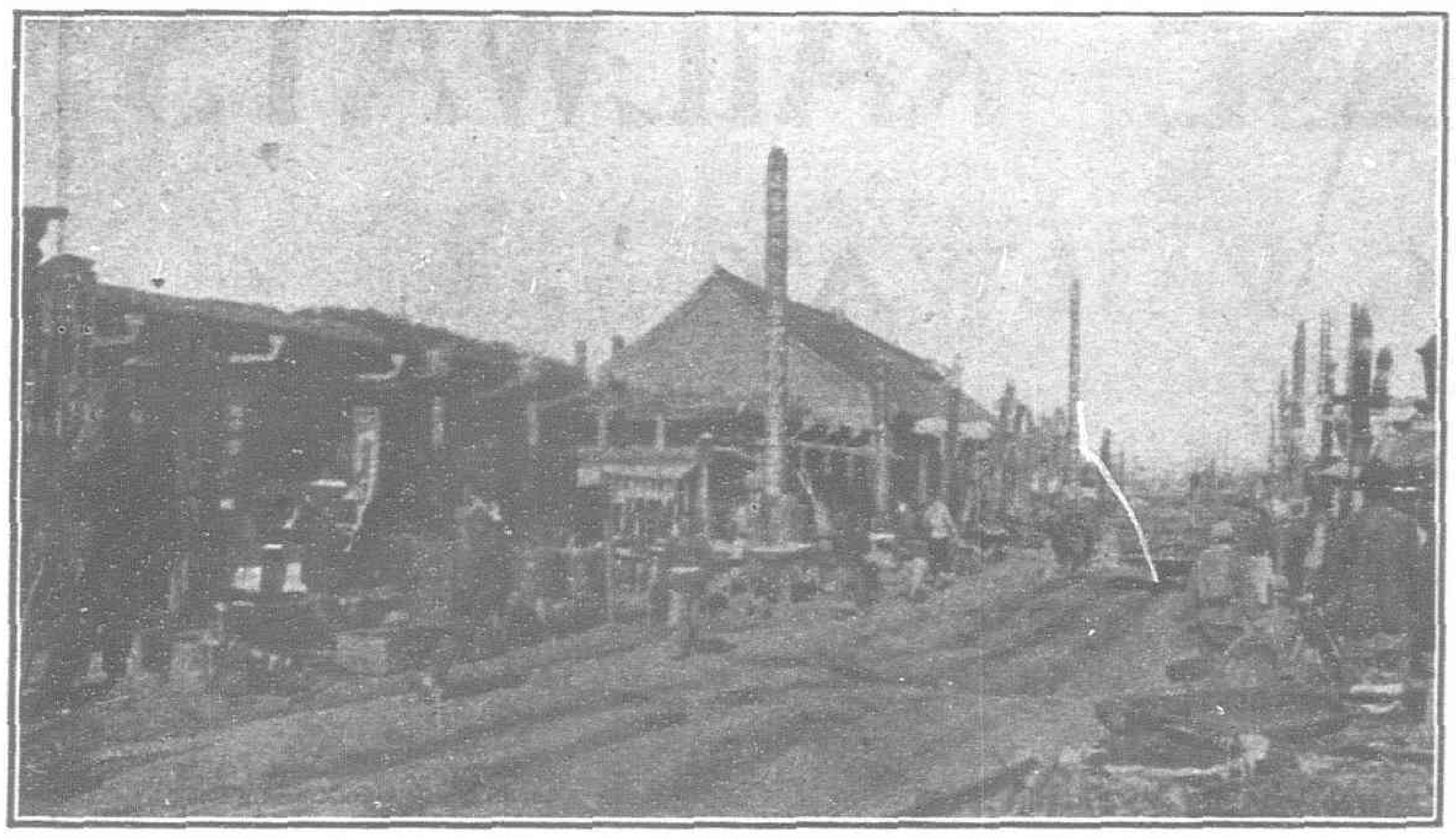


CHUNG-HUAN TEMPLE, KAIFENG-FU.

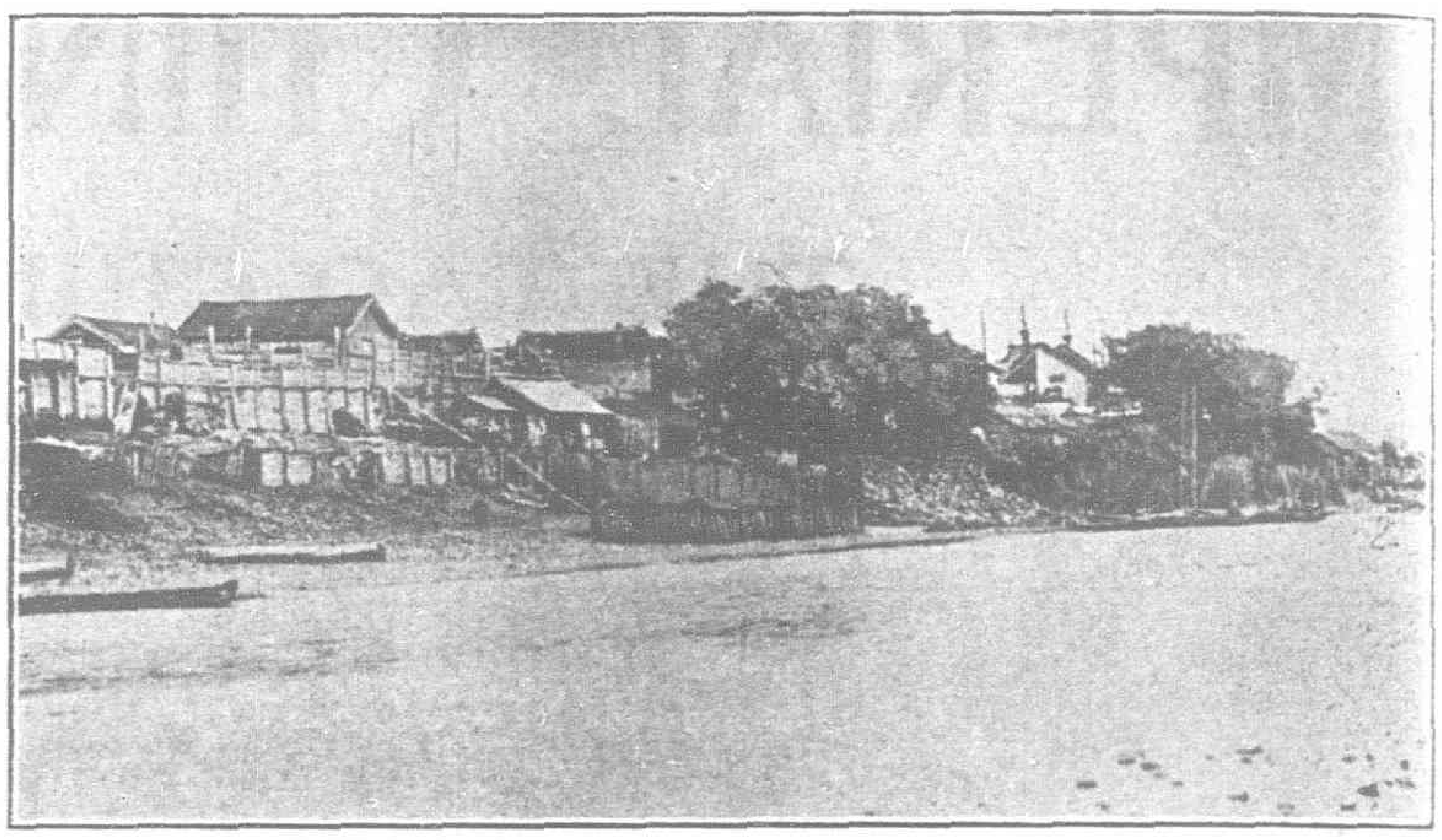
The line connects with the through service of the Peking-Hankow Railway at Tchng Tchéou, enabling the traveller to visit Kaifengfu, the provincial capital of Honan, and the old capital of the Empire at Honanfu.

IMPERIAL CHINESE RAILWAYS

KIRIN-CHANGCHUN LINE



CHINESE MARKET AT CHANG-CHUN



VIEW OF KIRIN FROM THE SUNGARI RIVER

THE FIRST SECTION OF THIS LINE IS NOW IN OPERATION

The Kirin-Changchun Railway.

We beg to notify the public that from the 1st day of the 12th moon, 2nd year of Hsuantung (Jan. 1st, 1911) the Kirin-Changchun Railway will be open to passenger and freight traffic by construction trains from Changchun to Coran, twice a day. This section is not yet formally opened to traffic; but passengers and merchandise may be conveyed in the construction cars at the tariff of thirty cents each person or per ton of freight without distinction of classes.

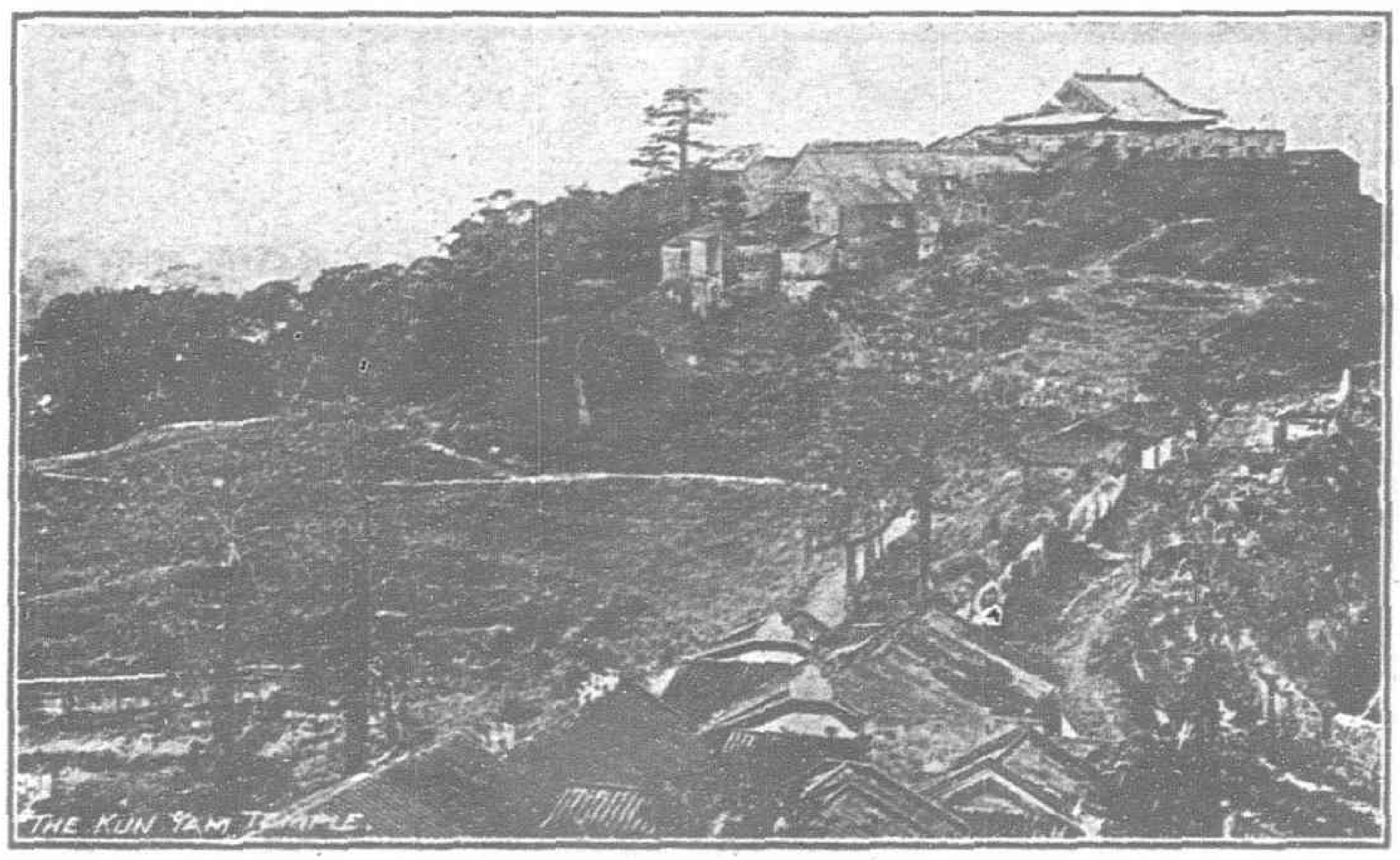
TIME TABLE

The Kirin-Changchung Railway

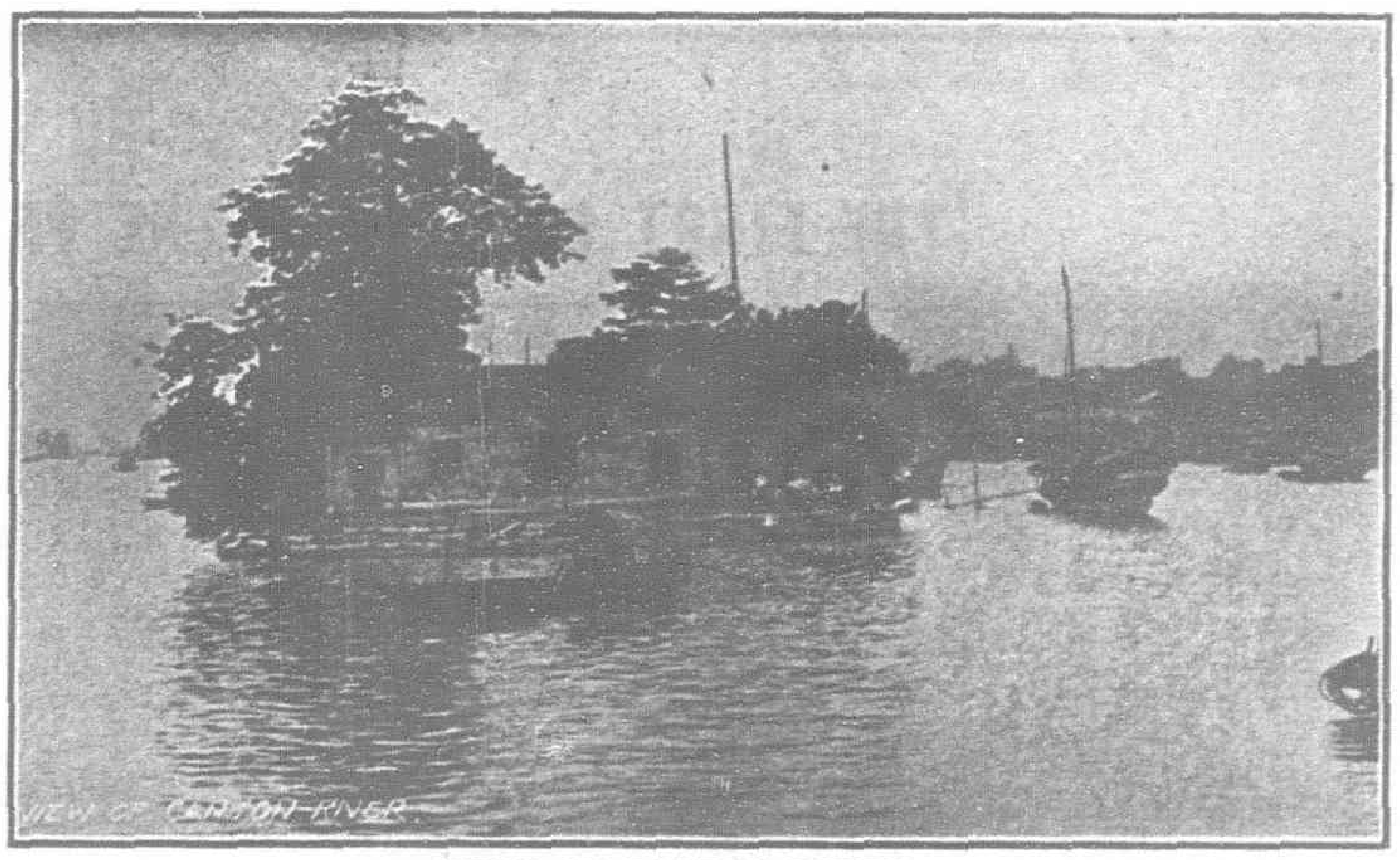
DOWN TRAIN			UP TRAIN		
Station	*No.* *1*	*No.* *2*	*Station*	*No.* *2*	*No.* *4*
	a. m.	a. m.		a. m.	p m.
Changchung	7:00	12:00	Coran	10:00	5:00
Coran	8:17	1:17	Changchung	11:17	4:17

IMPERIAL CHINESE RAILWAYS

CANTON-KOWLOON LINE



THE KUN YAM TEMPLE



VIEW OF CANTON RIVER

PUBLIC TIME TABLE

IN FORCE FROM 24th APRIL, 1911, UNTIL FURTHER NOTICE.

Canton (Tai Sha Tou) to Shek Lung

Miles	STATION		Daily Passenger Trains. No. 1	No 3	No. 5
			A. M.	P. M.	A. M.
	Canton (TAI SHA TOU)	dep	7.30	11.00	3 00
3.63	Shiek Pai	arr	7.39	11.09	3.09
		dep	7.42	11.12	3.12
7 90	Che Pi	arr	7.53	11.23	3 23
		dep	7.56	11.26	3 26
12 58	Wu Chung	arr	8 07	11.37	3 37
		dep	8.10	11 40	3 40
17.09	Nam Kong	arr	8.21	11.51	3.51
		dep	8.25	11.55	3.55
21.67	Sun Tong	arr	8.37	12.07	4.07
		dep	8.41	12.11	4.11
23.61	Tong Mei	arr	8.46	12.16	4.16
		dep	8.50	12 20	4.20
25.54	Nga Yeo	arr	8 55	12 25	4 25
		dep	8 58	12.28	4 28
29.00	Sien Tsun	arr	9 07	12.37	4.37
		dep	9.11	12.41	4 41
32.25	Shek Ha	arr	9 22	12 52	4 52
		dep	9-24	12,54	4 54
34.77	Shek Tan	arr	9.33	1.03	5 03
		dep	9 37	1,07	5 07
36.34	Shek Lik Kou	arr	9.43	1.13	5.13
		dep	9.45	1.15	5.15
40.15	Shek Lung	arr	9.58	1.28	5.28

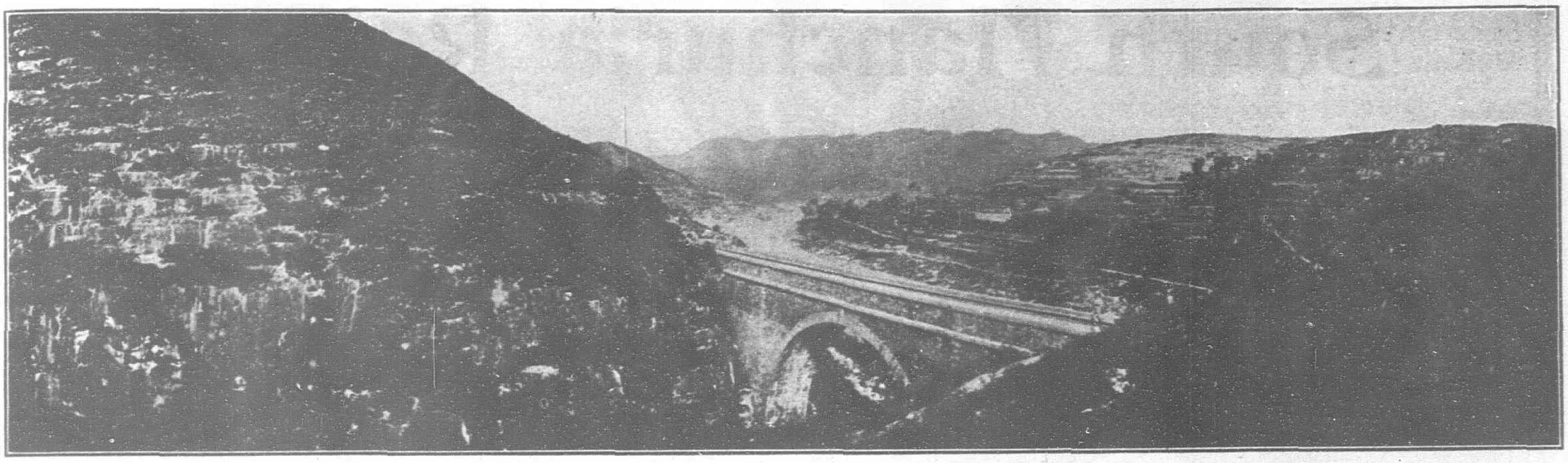
Shek Lung to Canton (Tai Sha Tou).

Miles	STATION		Daily Passenger Trains. No. 2	No. 4	No. 6
			A. M.	P. M	P M.
	Shek Lung	dep	7·35	11.05	3.05
3 81	Shek Lik Kou	arr	7.48	11 18	3.18
		dep	7·50	11.20	3.20
5.38	Shek Tan	arr	7.56	11.26	3.26
		dep	8.00	11.30	3.30
7.90	Shek Ha	arr	8.09	11.39	3 39
		dep	8.11	11.41	3.41
11.1	Sien Tsun	arr	8.22	11 52	3.52
		dep	8 26	11.56	3.56
.61	Nga Yeo	arr	8 35	12 05	4 05
		dep	8.38	12 08	4 08
16.54	Tong Mei	arr	8.43	12.13	4.13
		dep	8.47	12.17	4.17
18. 48	Sun Tong	arr	8 52	12.22	4.22
		dep	8.56	12 26	4 26
23.06	Nam Kong	arr	9.08	12.38	4.38
		dep	9.12	12.42	4.42
27.57	Wu Chung	arr	9 23	12.53	4.53
		dep	9.26	12.56	5 56
32 25	Che Pi	arr	9.37	1.07	5.07
		dep	9 40	1.10	5.10
36.52	Shek Pai	arr	9.51	1.21	5 21
		dep	9.54	1.24	5 24
40.15	Canton (TAI SHA TOU)	arr	10.03	1.33	5 33

IMPERIAL CHINESE RAILWAYS

The Cheng-Tai Railway

(*IMPERIAL GOVERNMENT SHANSI LINE—CHENGTINGFU TO TAIYUANFU*)

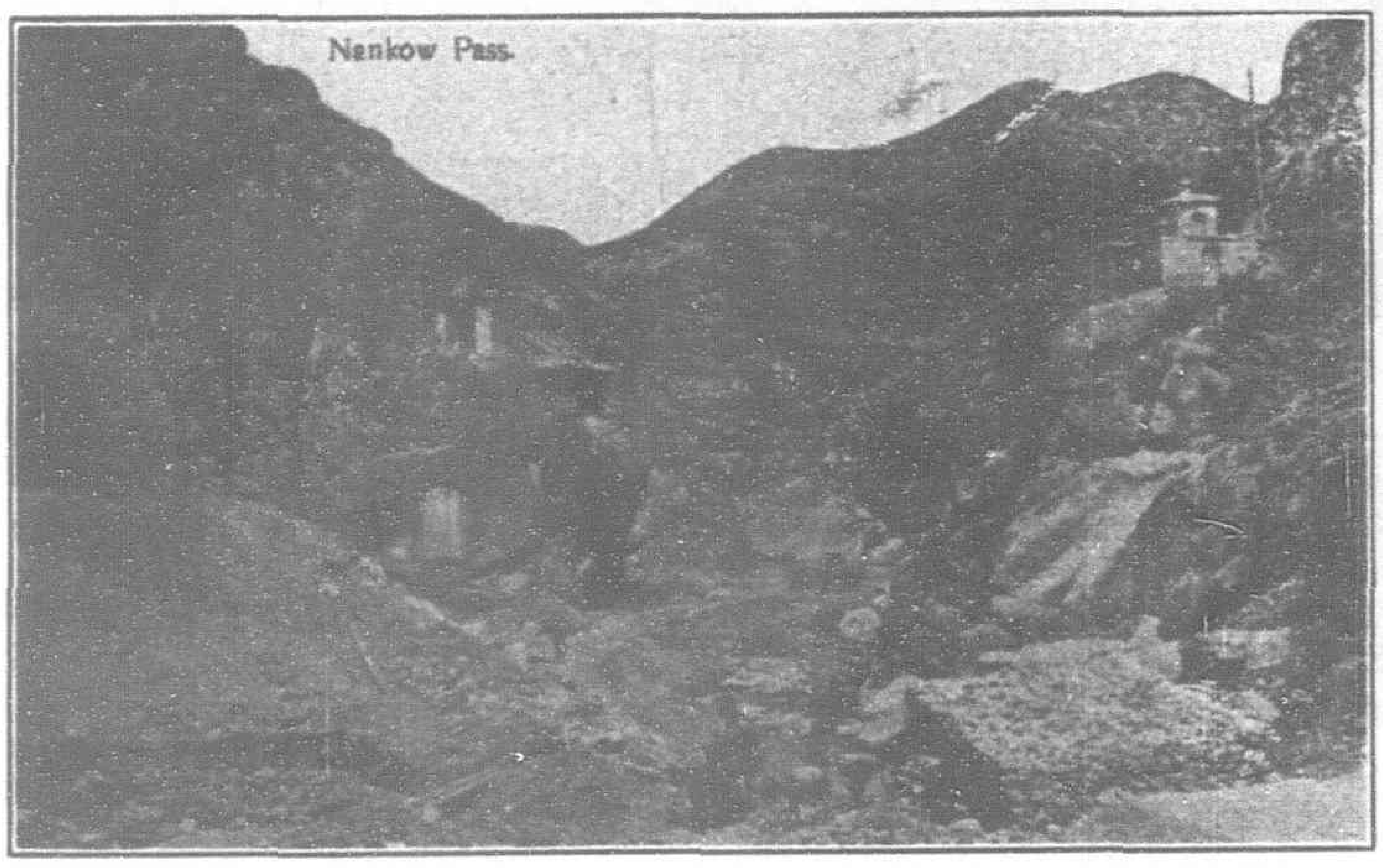


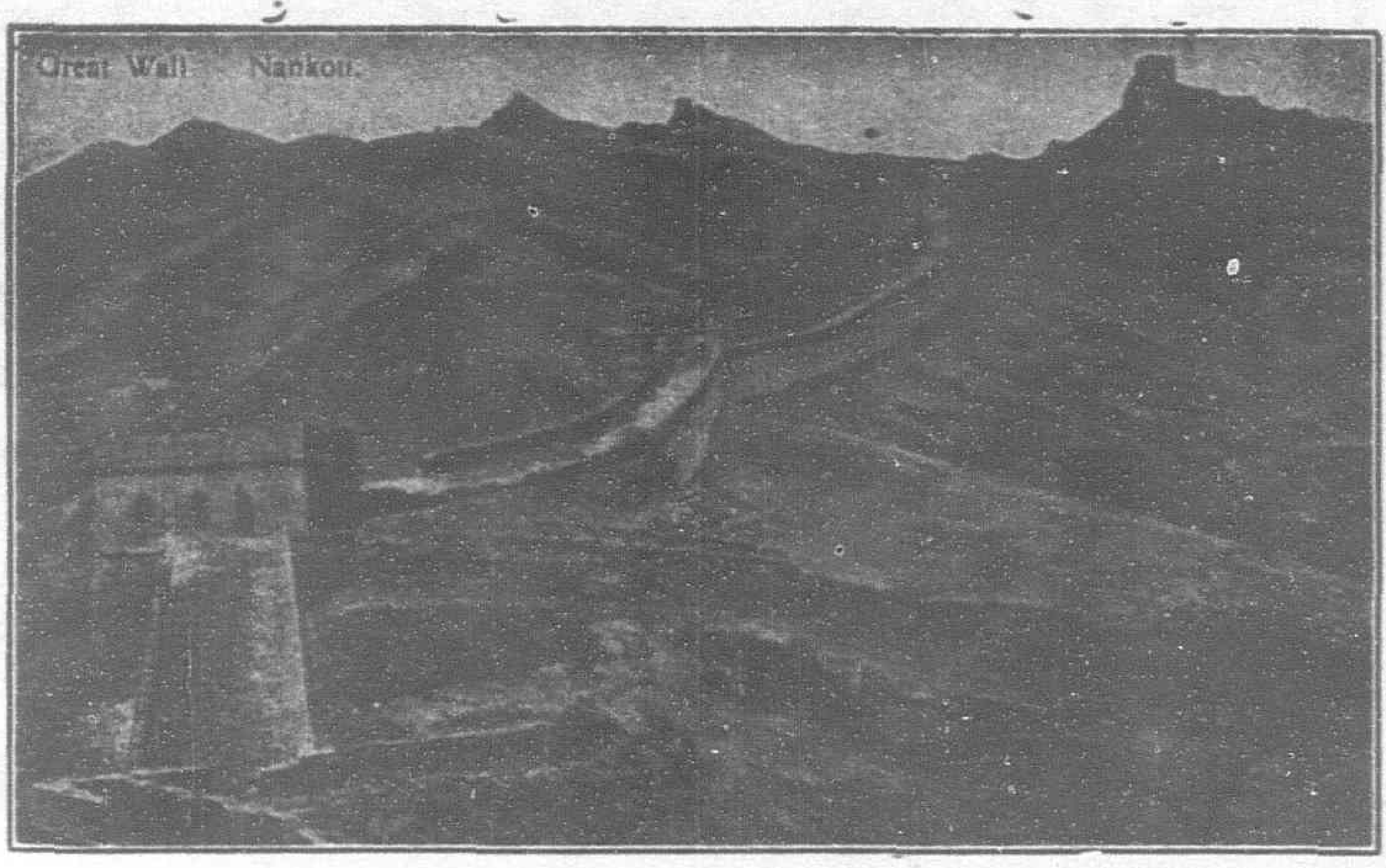
VIEWS ALONG ROUTE OF CHENG-TAI RAILWAY.

The trains of this line connect with the through service of the Peking-Hankow Railway, affording Travellers the opportunity of seeing the most picturesque part of China. The line passes through a mountainous section of country, rich in Mineral Resources to the Provincial Capital of Shansi at Taiyuanfu. This interesting city is a great educational center, and famous for the fine quality of its artistic embroideries.

The Peking-Kalgan Line

"THE ROAD TO THE GREAT WALL"





This line follows the ancient caravan route and military highway from Mongolia into China by the way of the historic Nankow Pass. This pass is the Key to Peking, and Kalgan is the gate of the Empire. From here the great camel caravans set out on their long journeys across Mongolia to Siberia and Central Asia. This old frontier mart, retaining its time-honored characteristics, one of the most interesting sights of the Old World, is made accessible by the new railway. The line also carries the passenger in two hours from Peking to Nankow, when the Great Wall of China and the Ming Tombs may be seen. A foreign hotel is operated by the railway authorities at Nankow, where chairs and guides may be secured for the Tombs.

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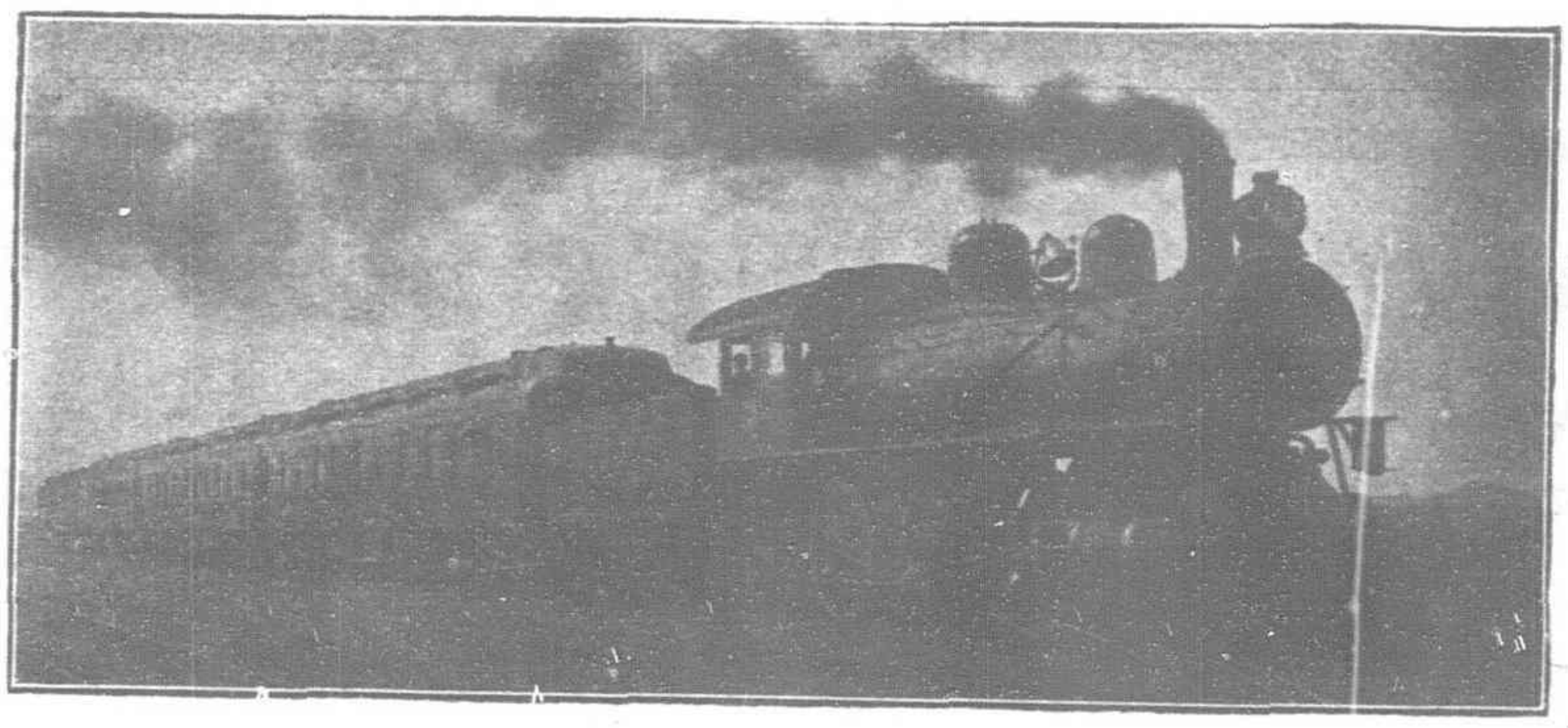

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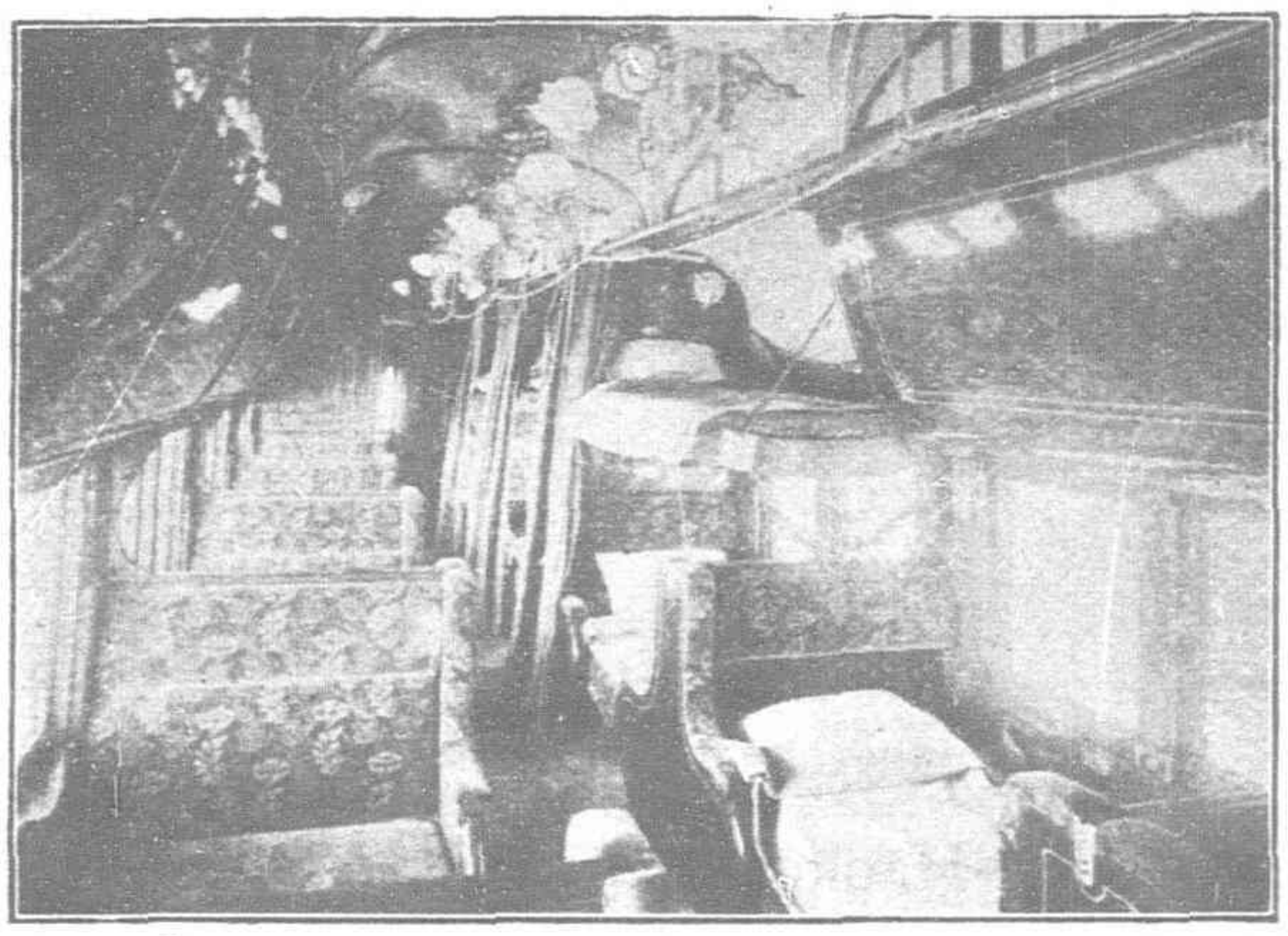

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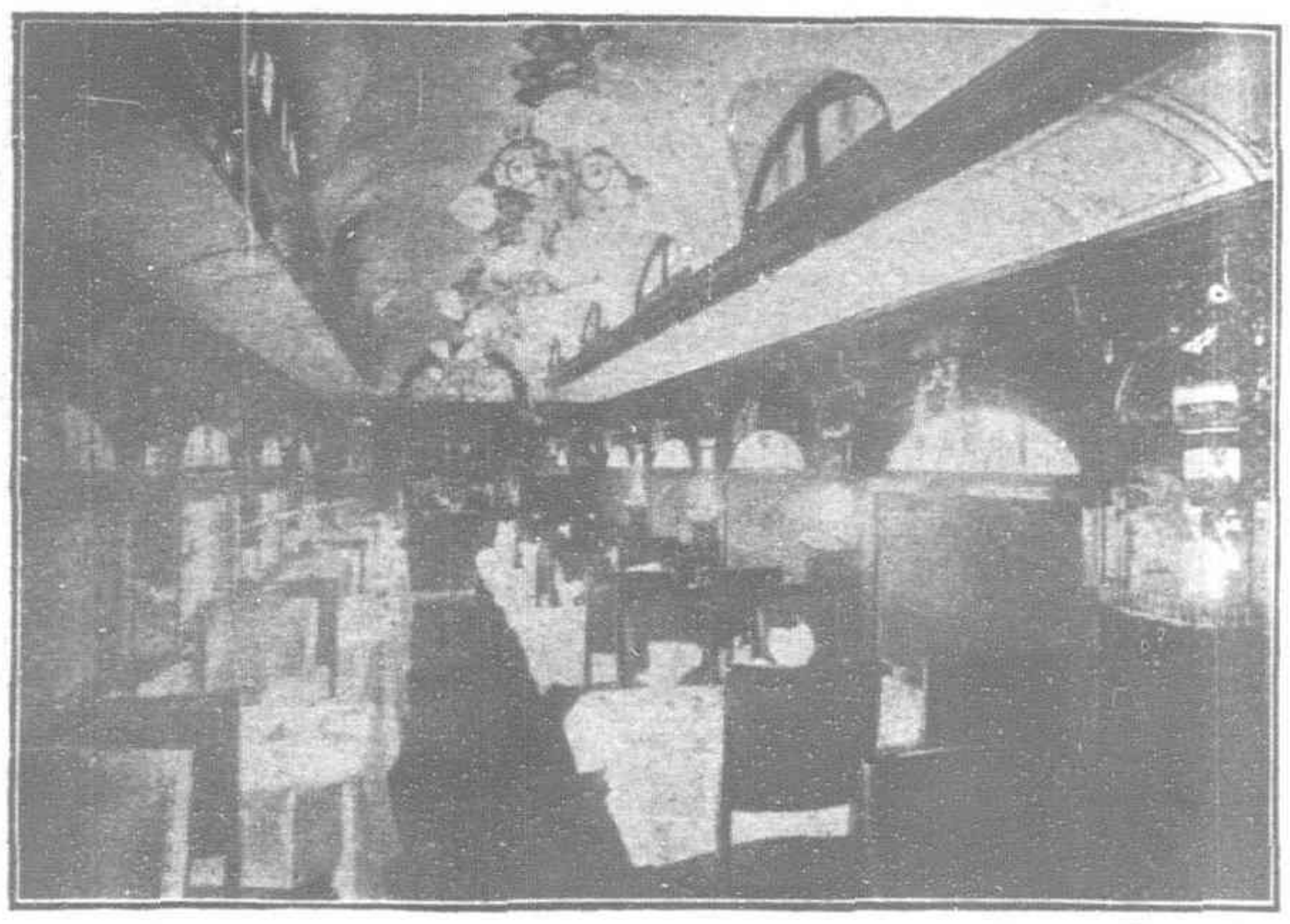

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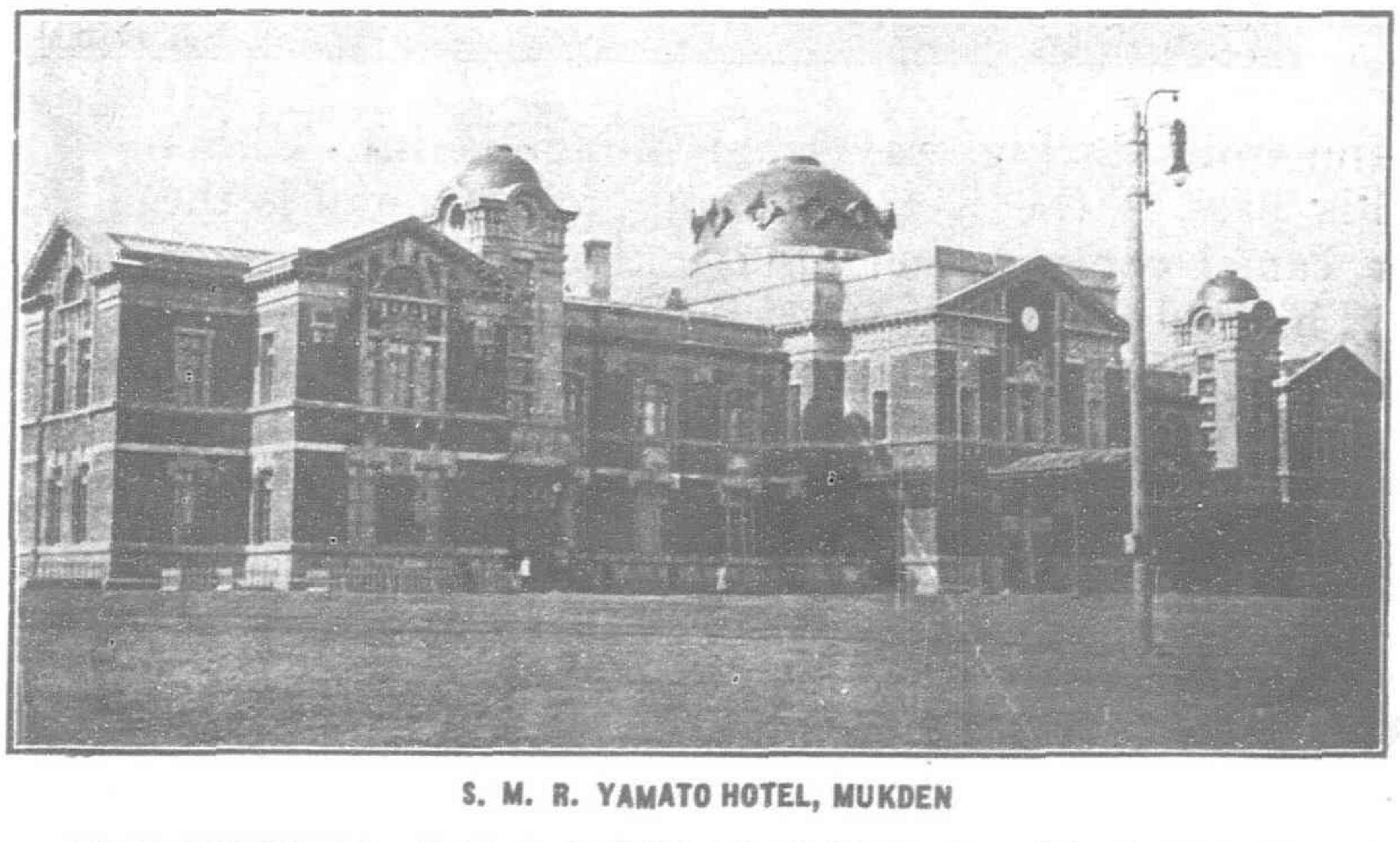

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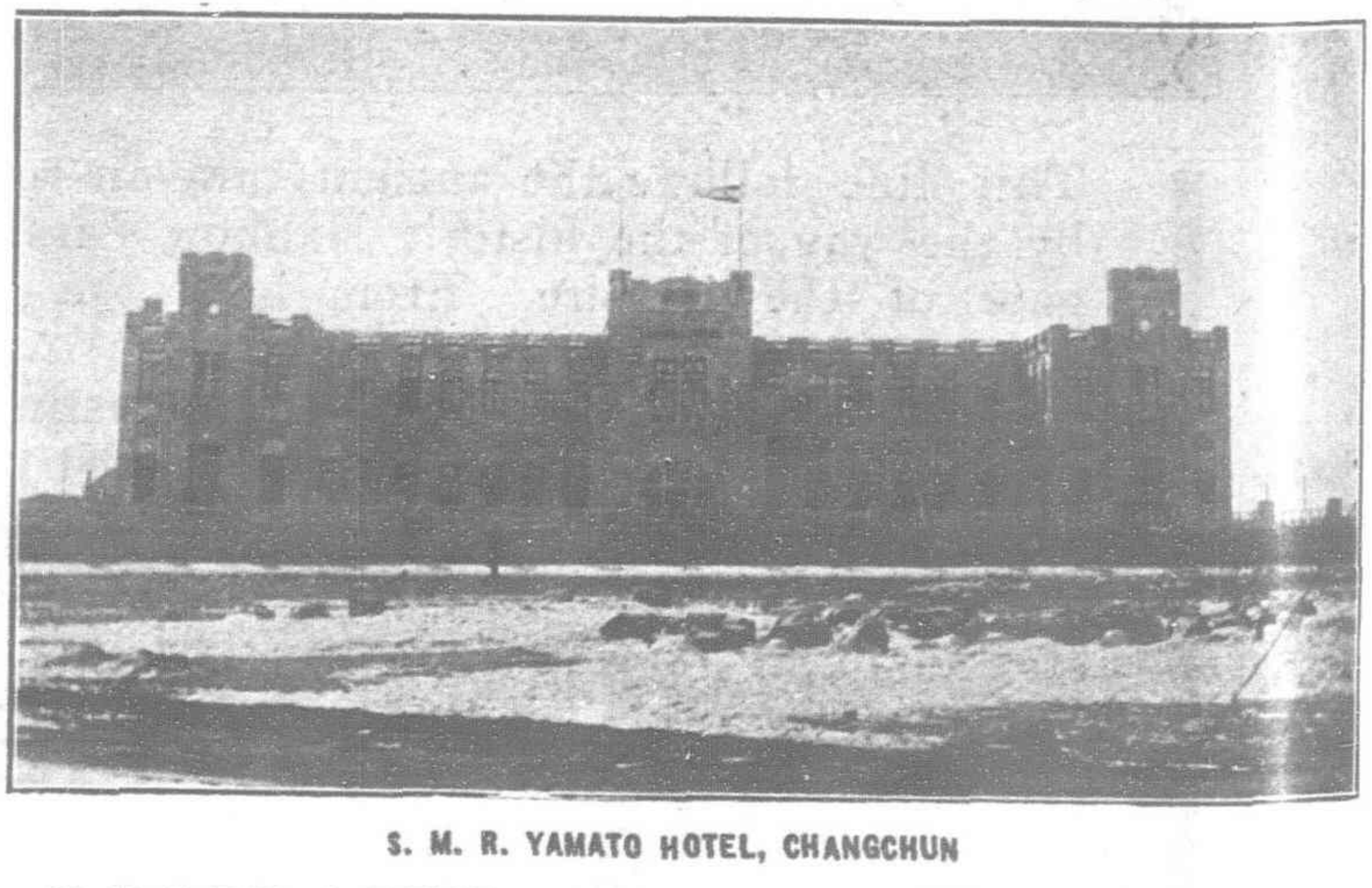

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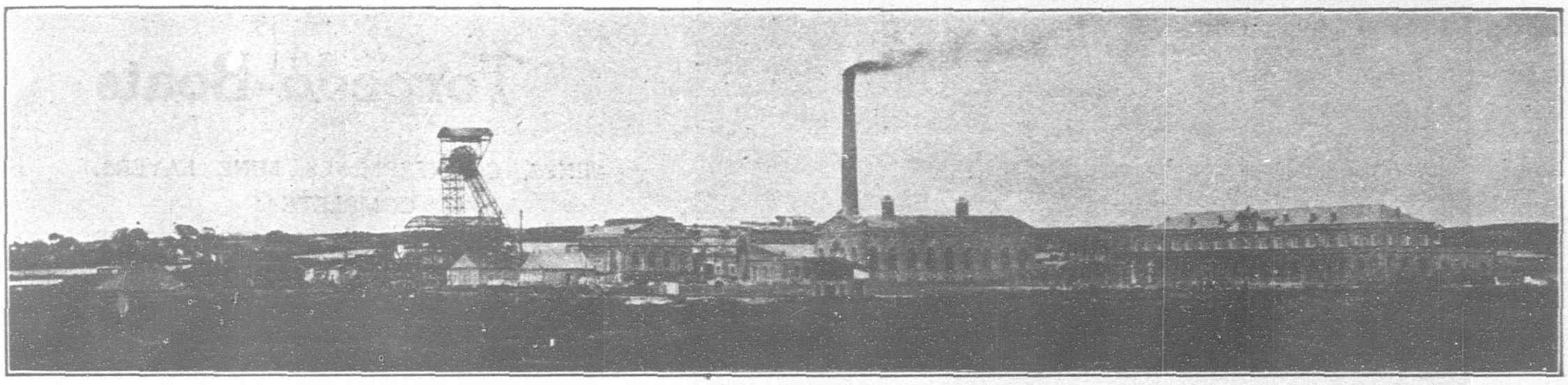

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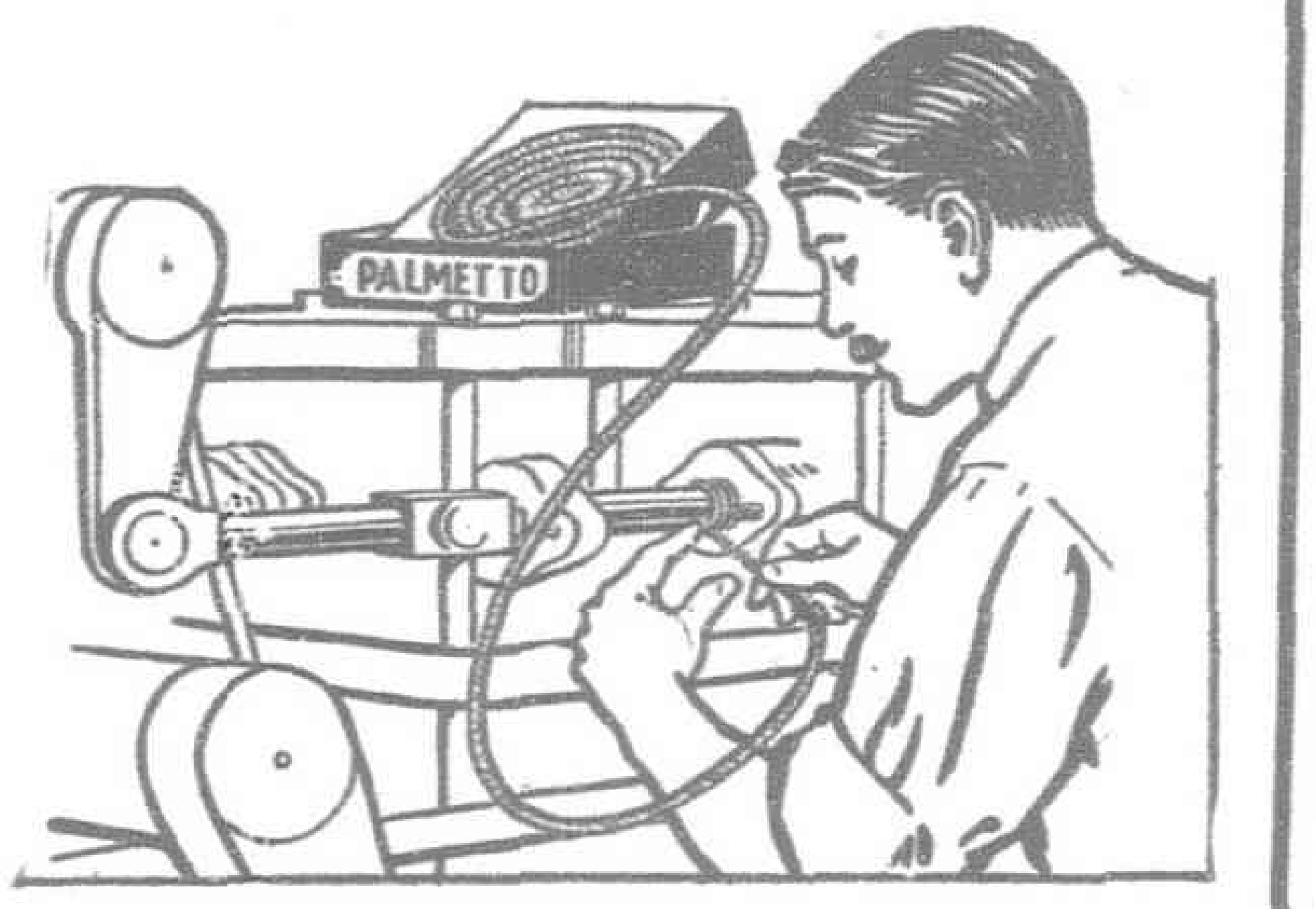

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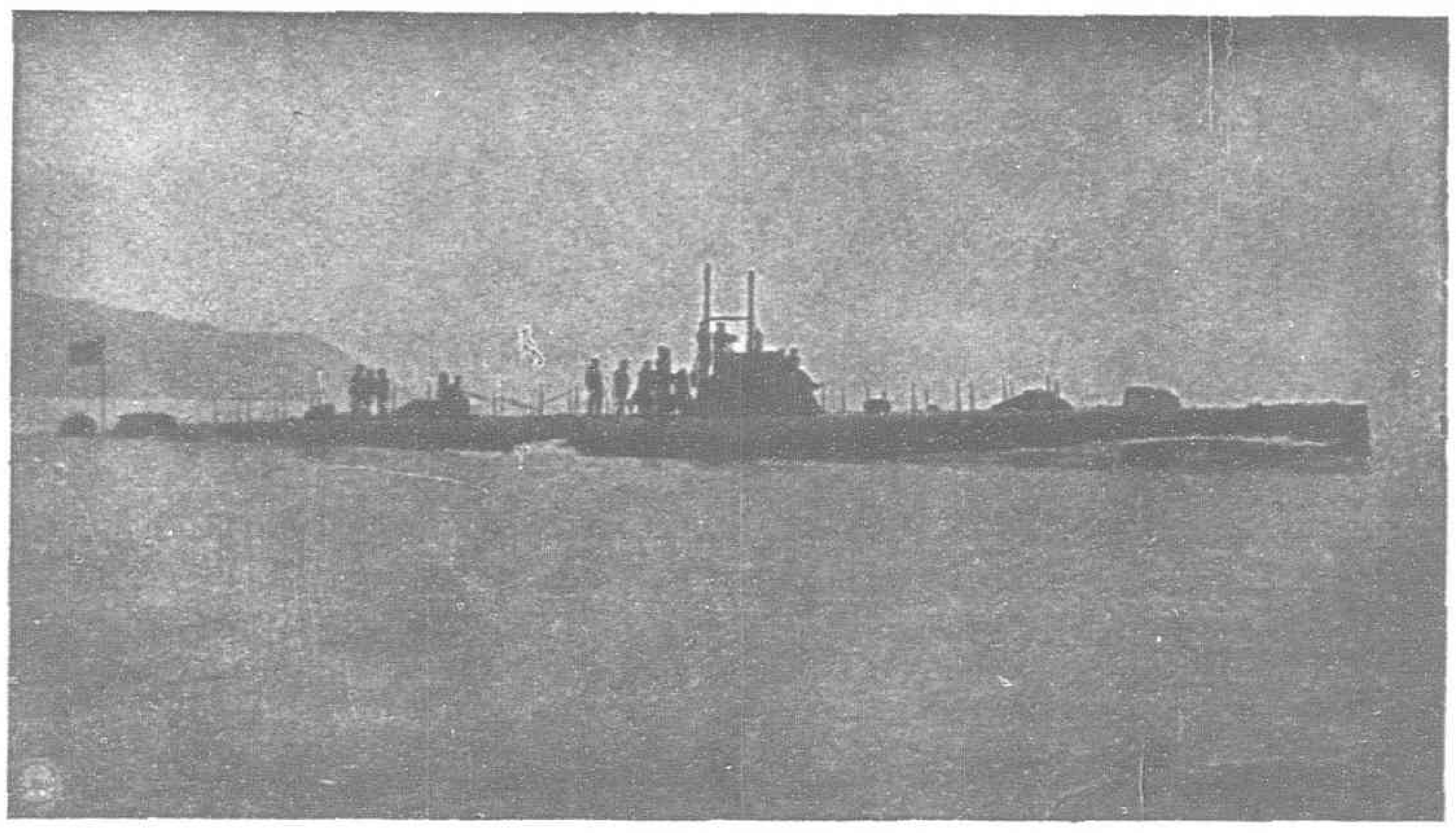

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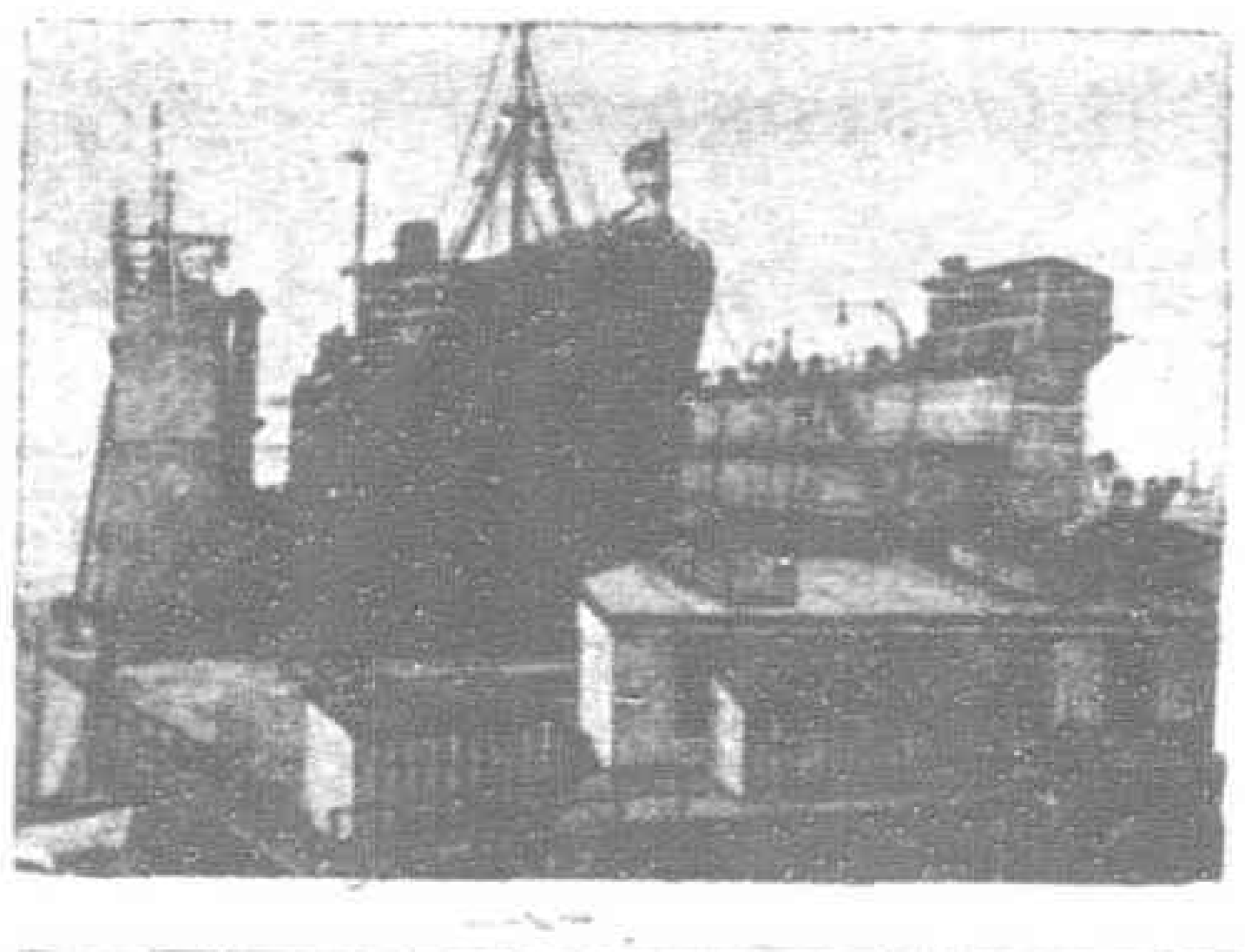

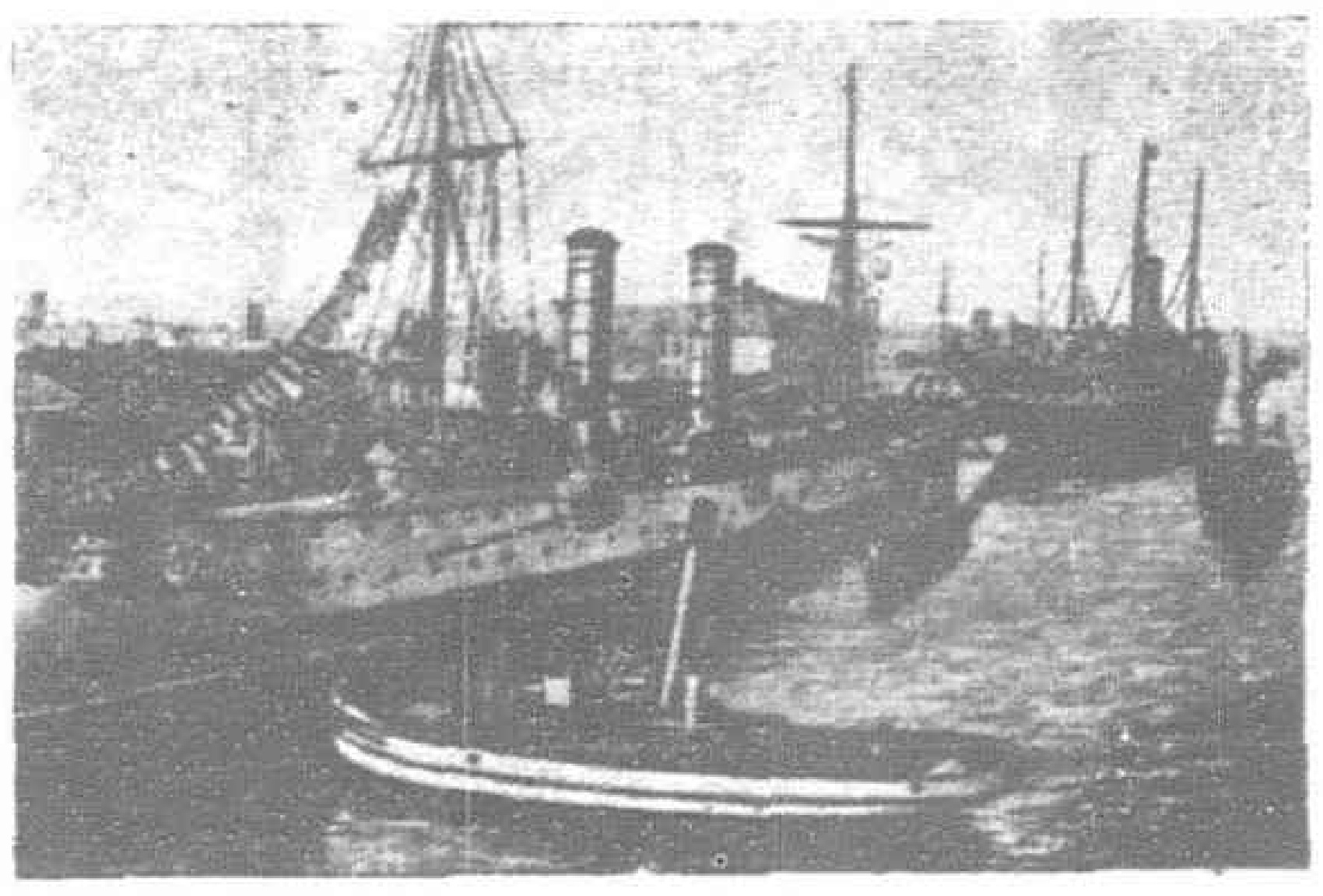

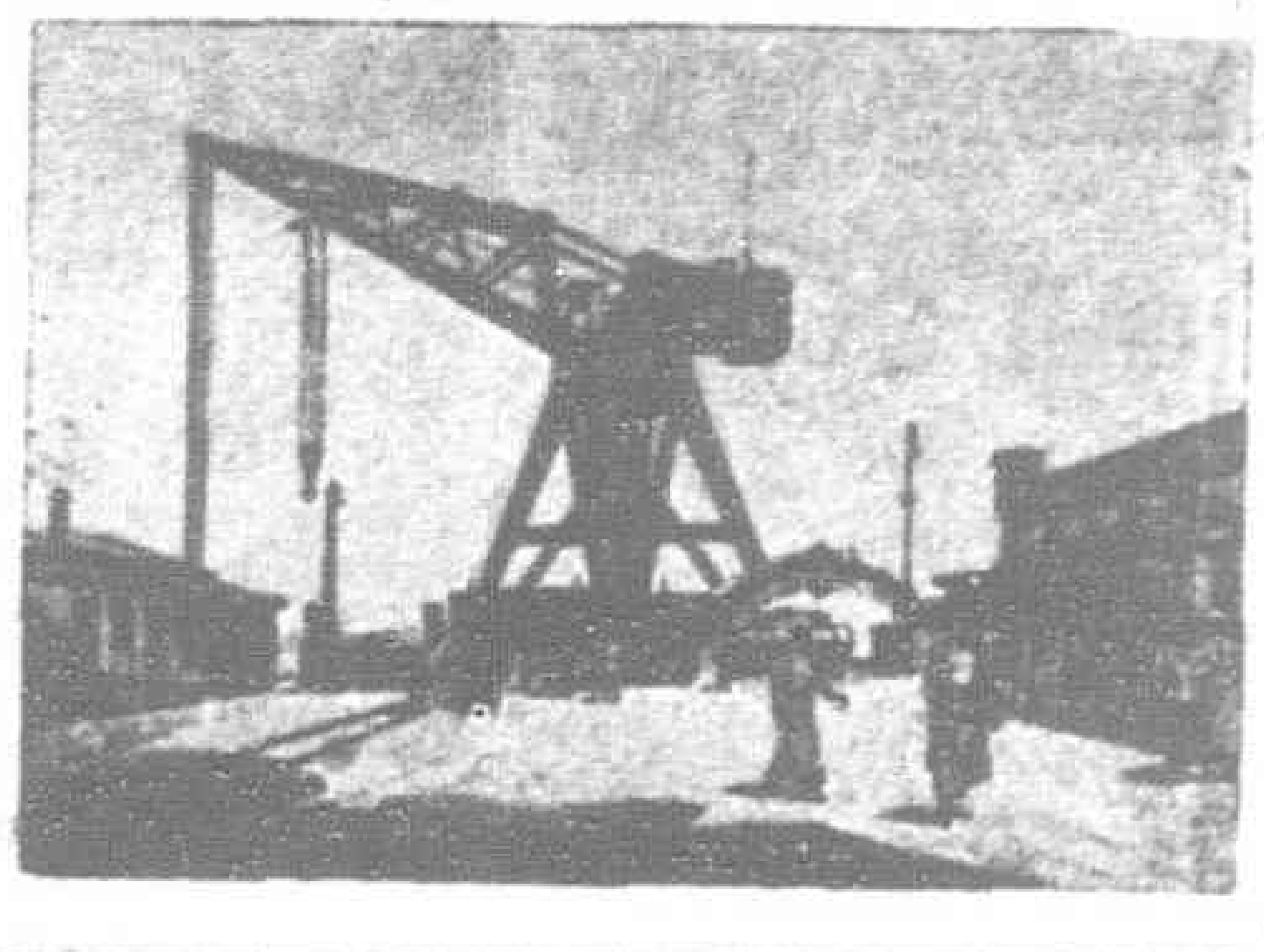

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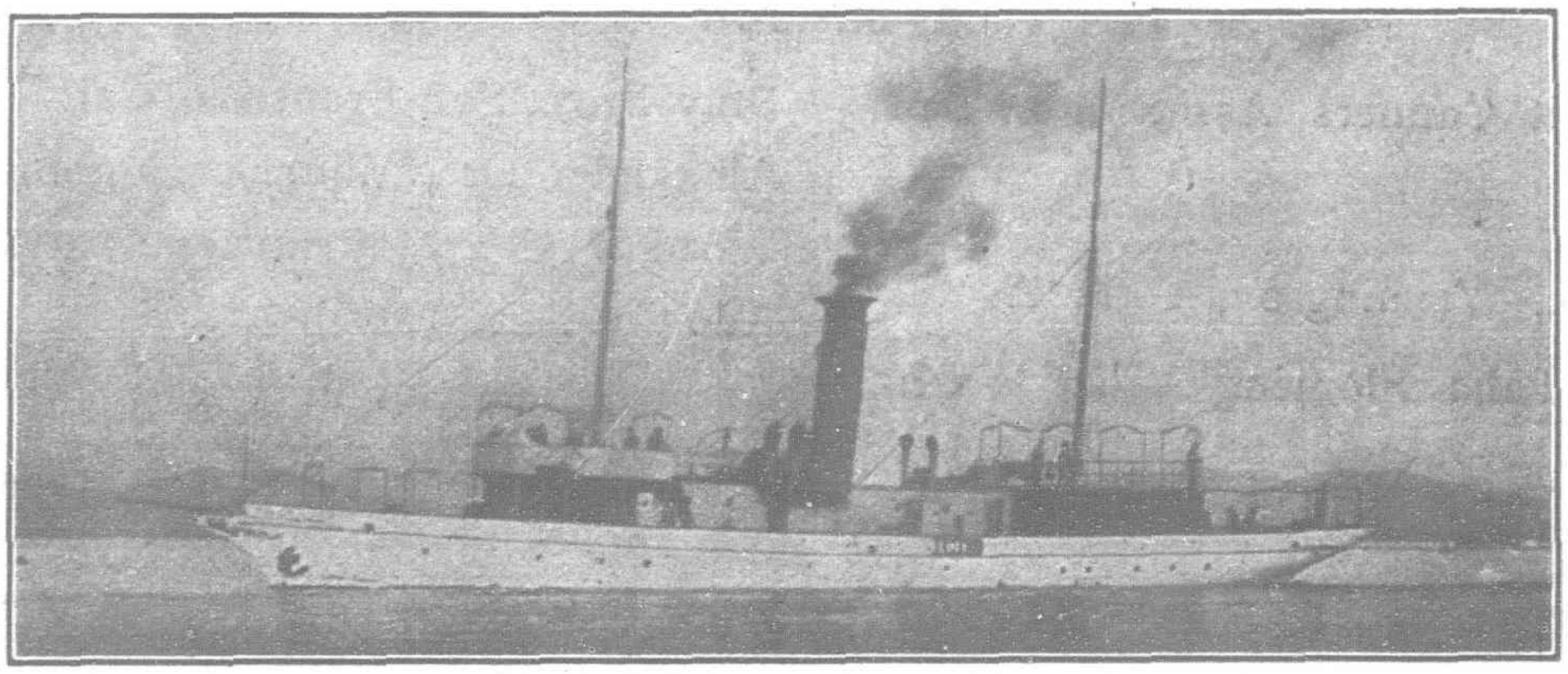

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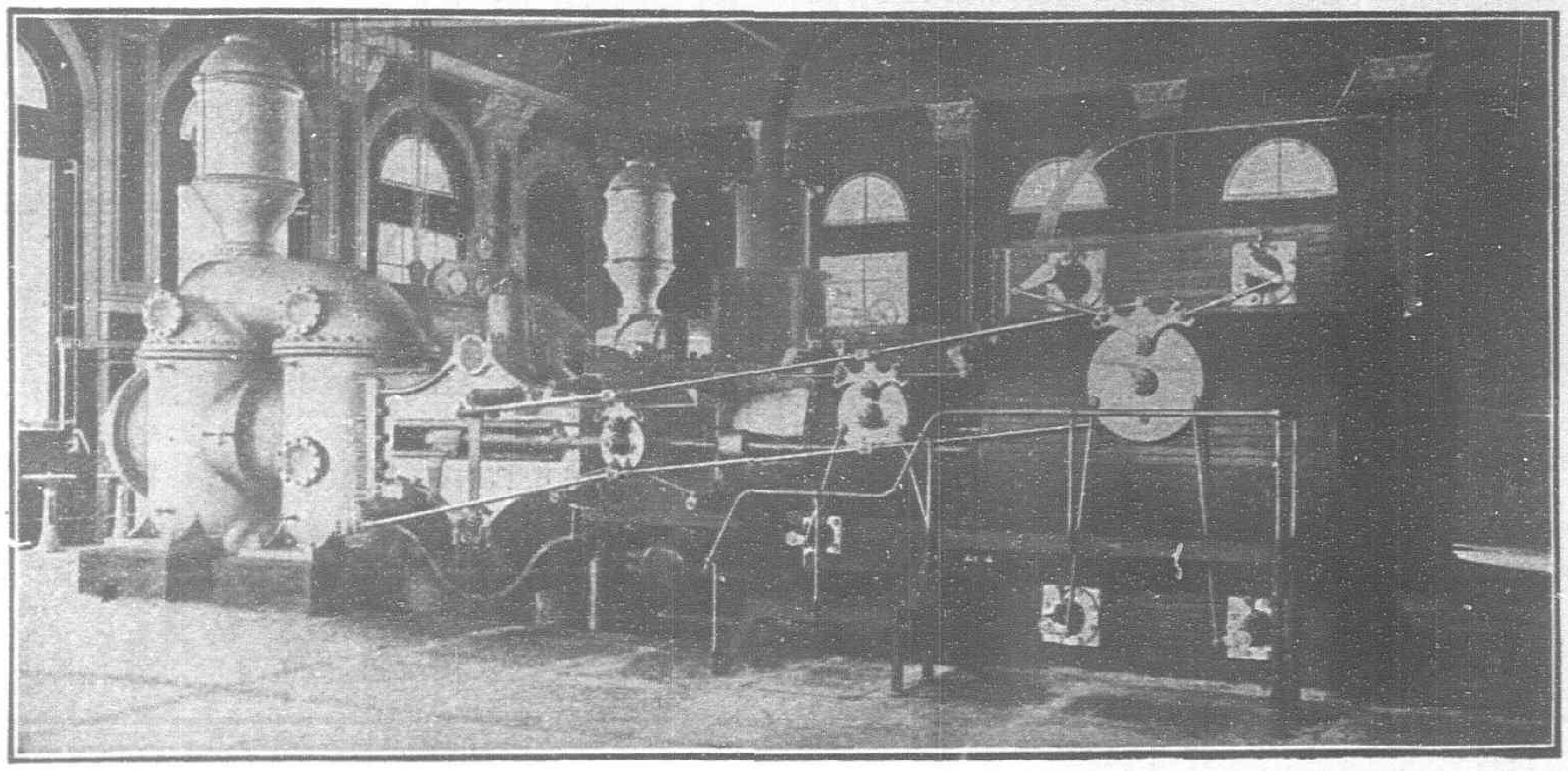

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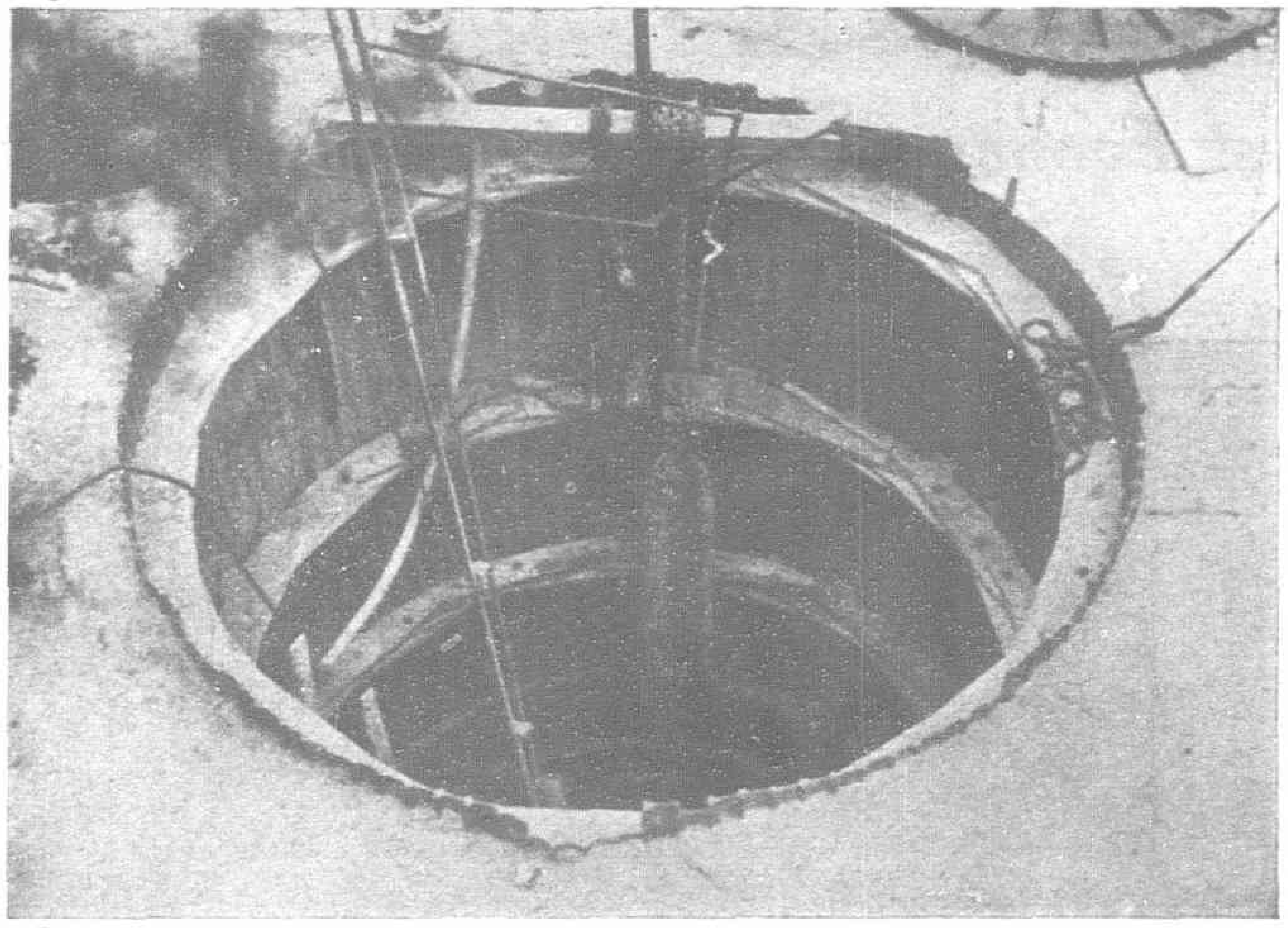

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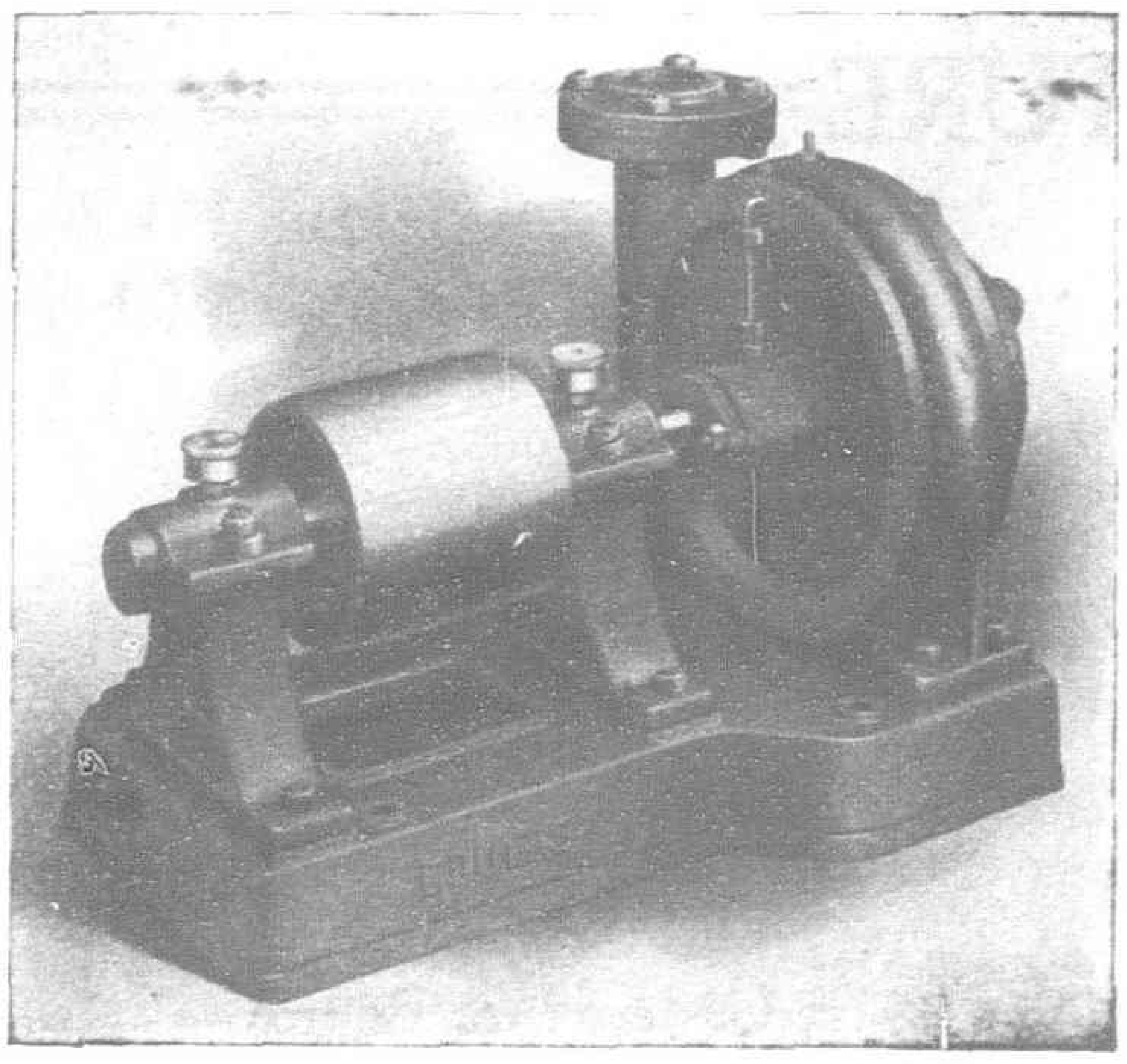

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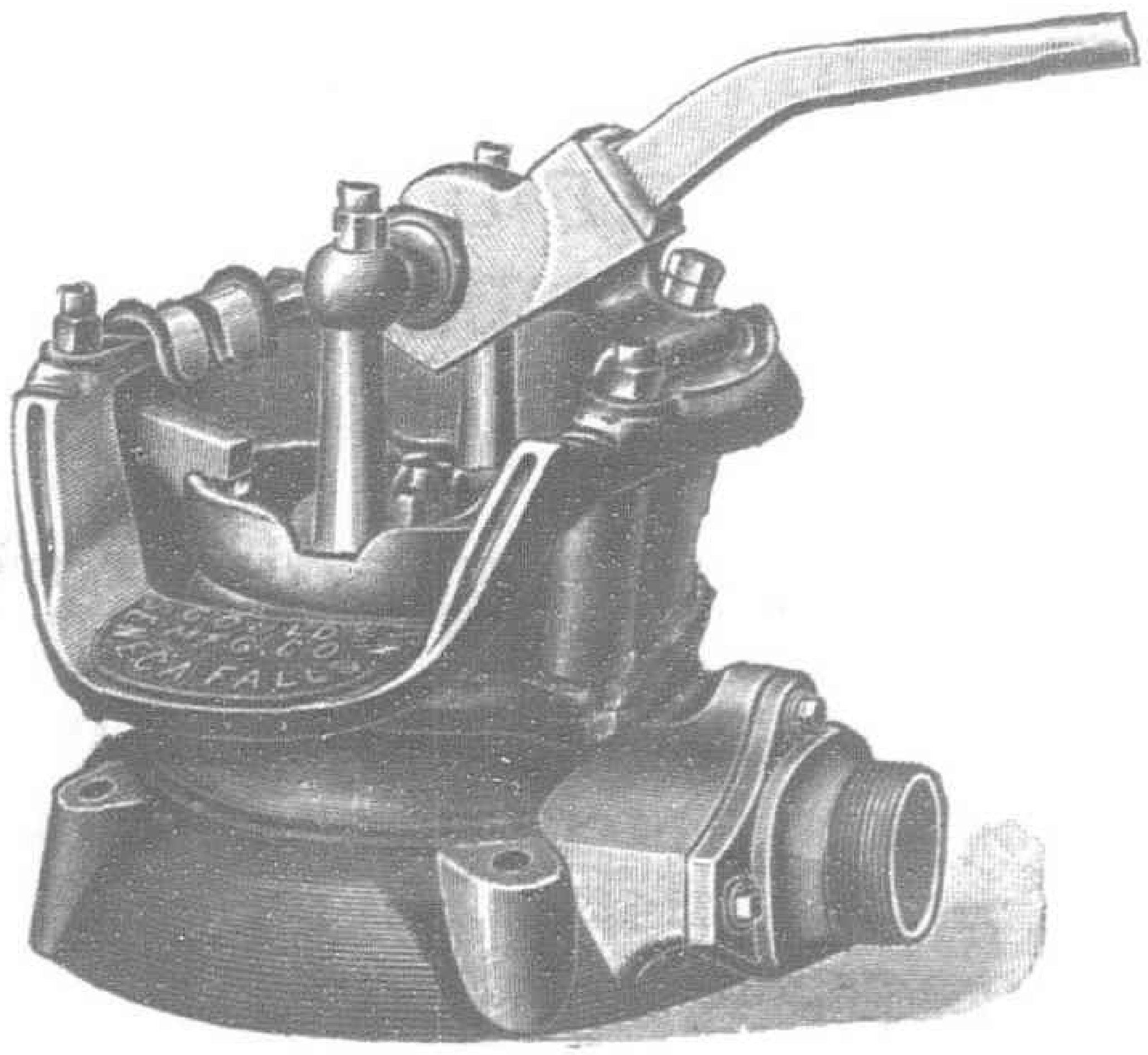

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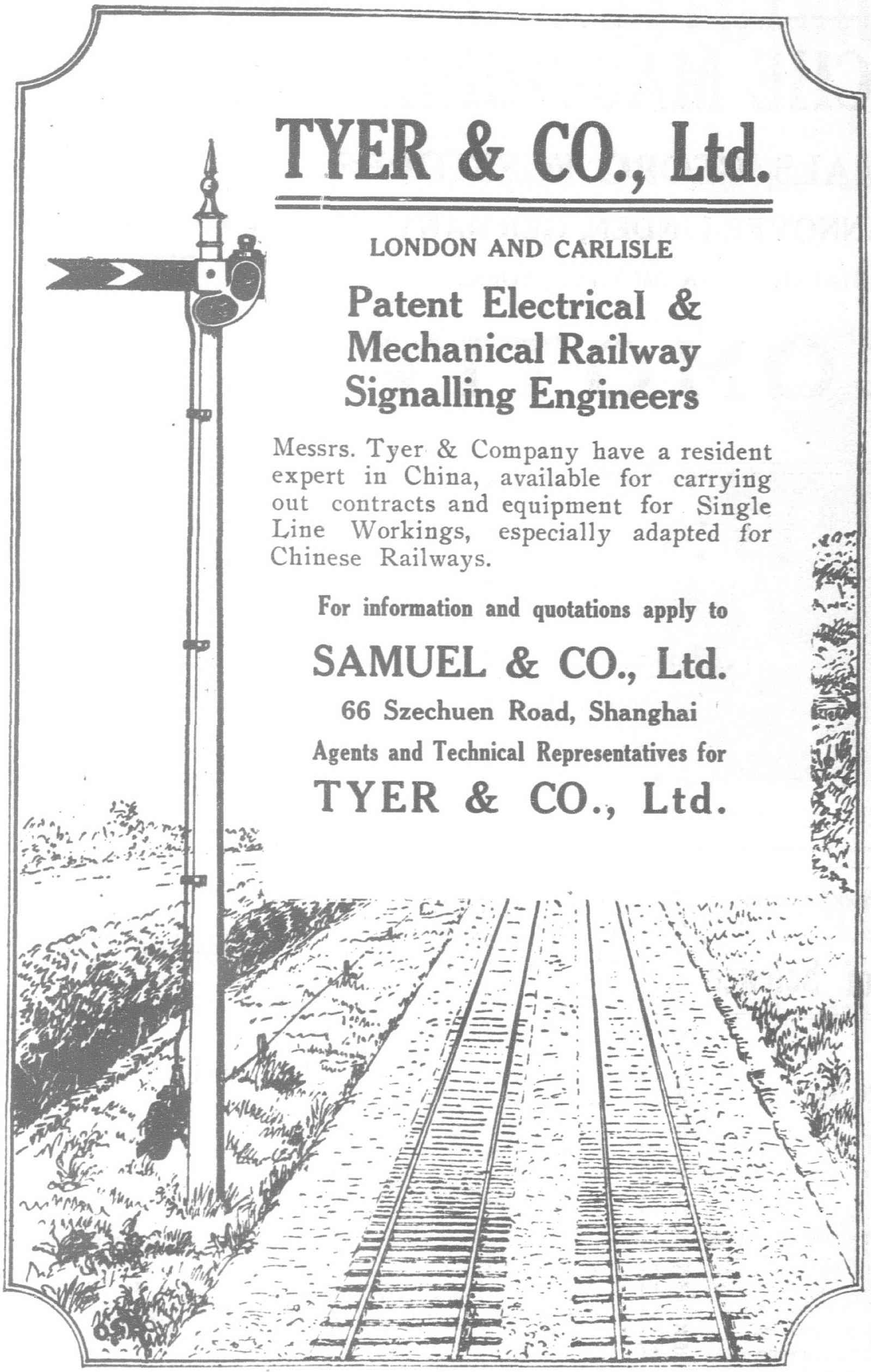

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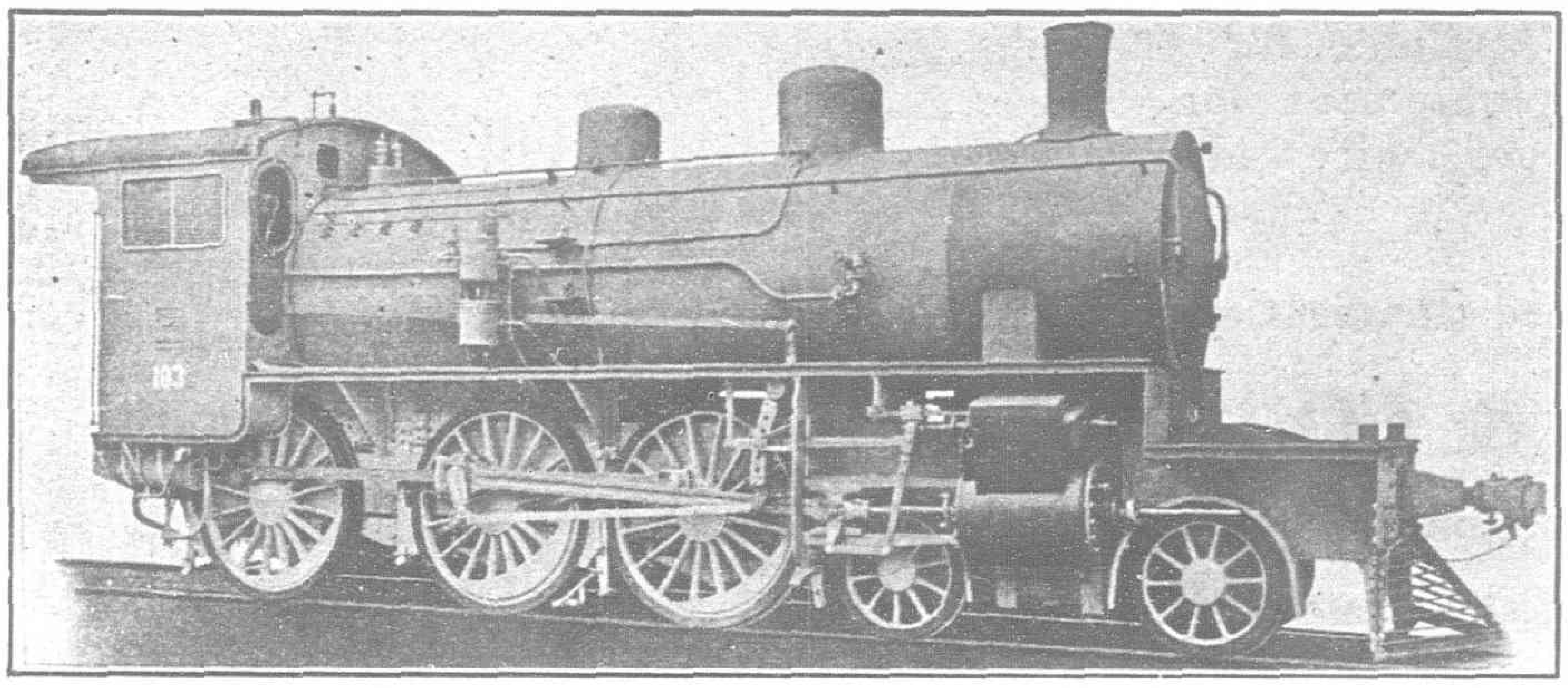

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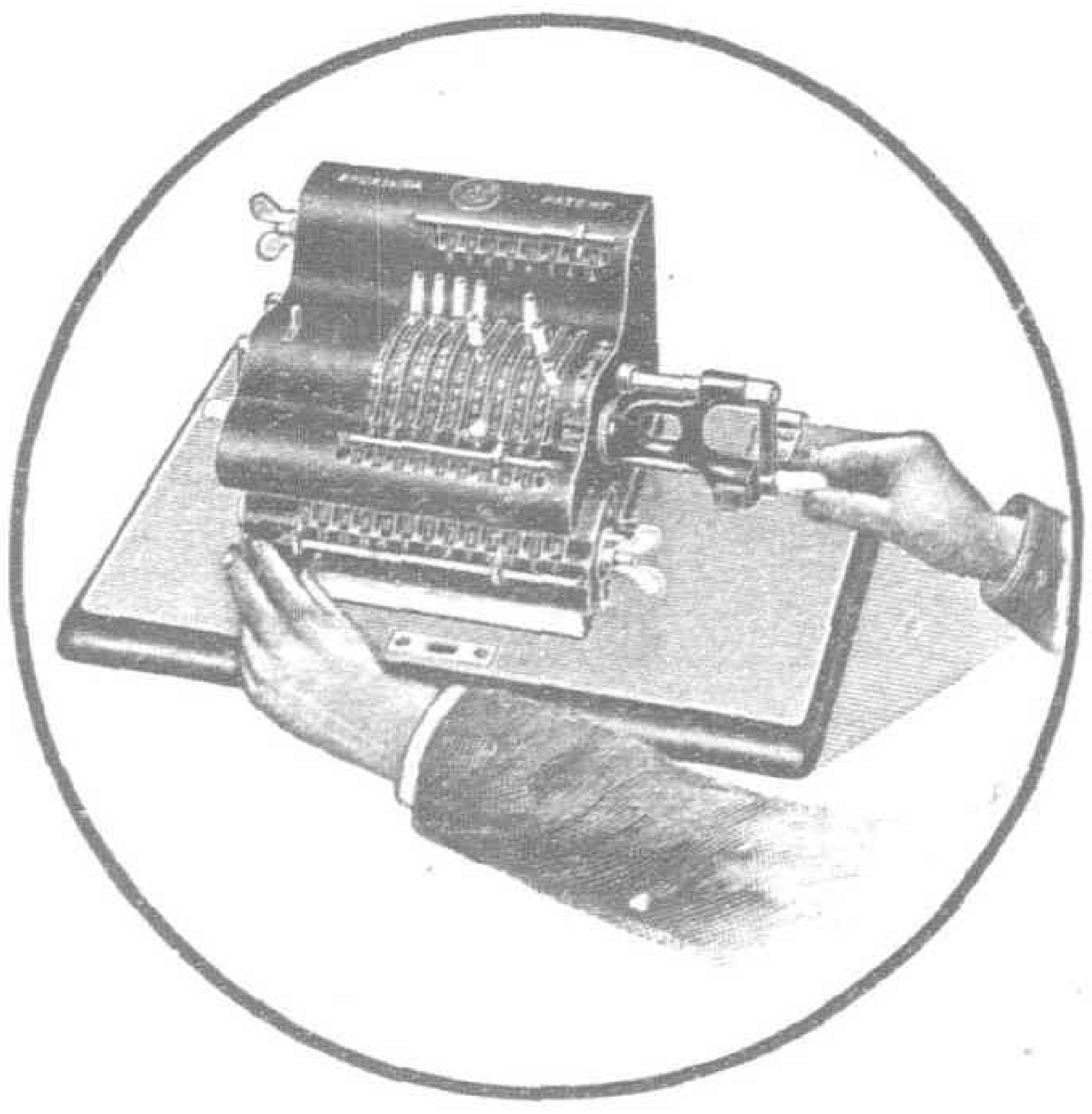

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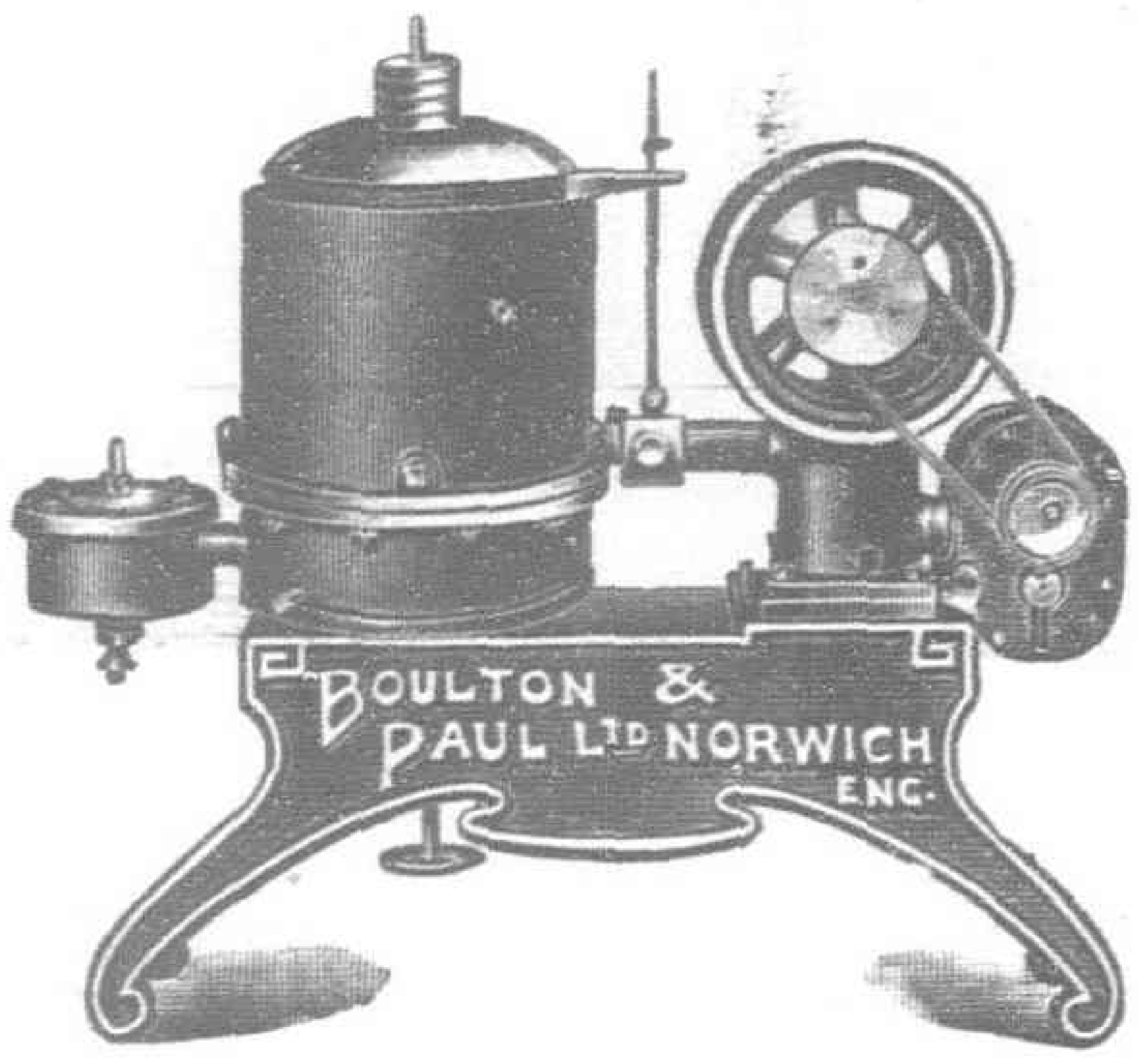

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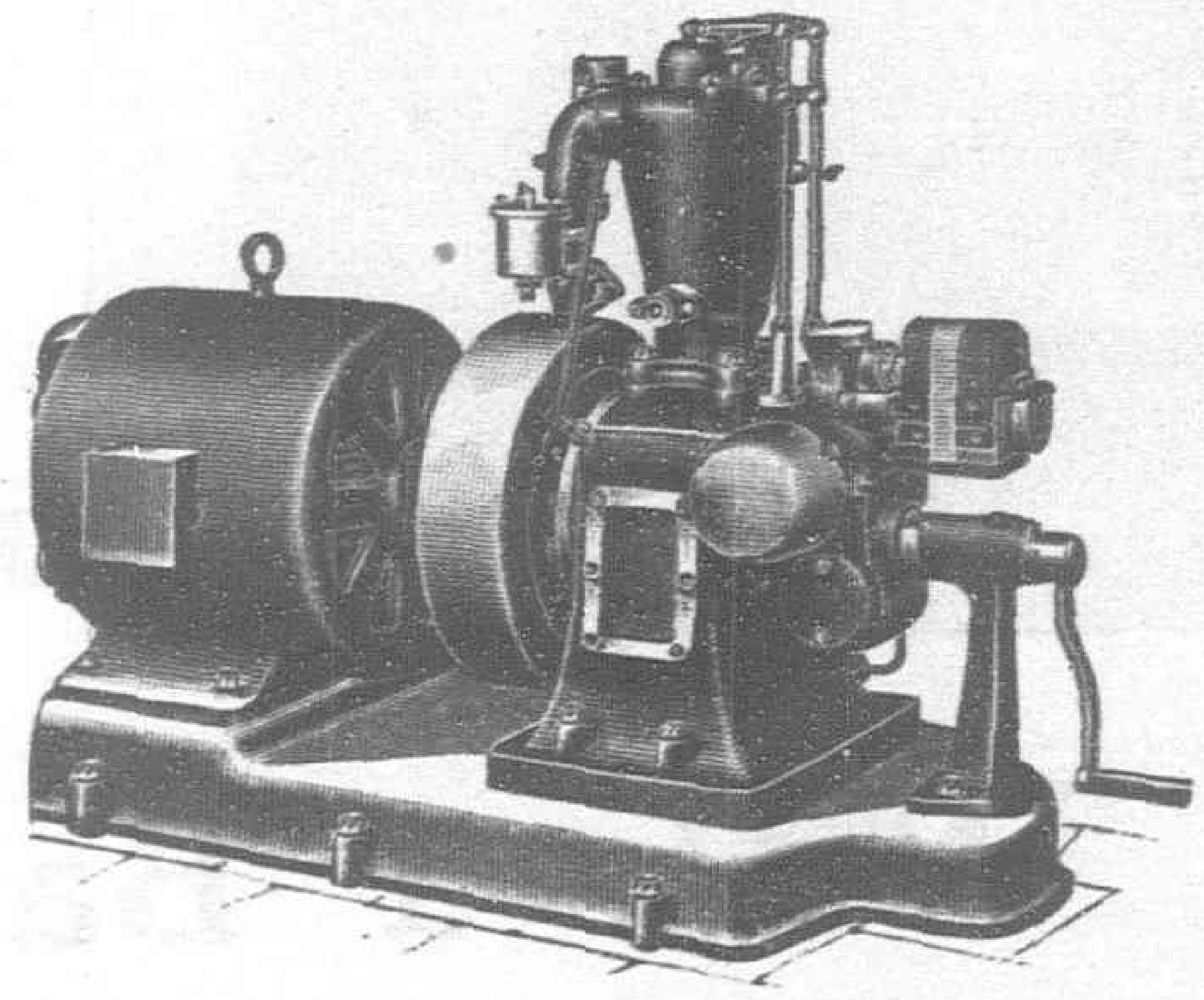

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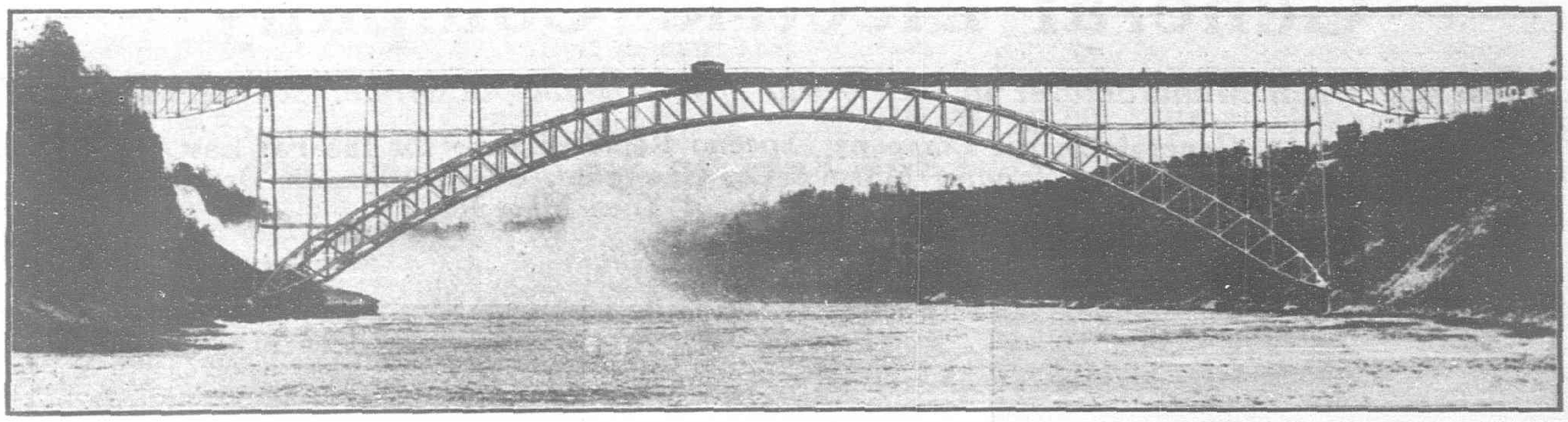

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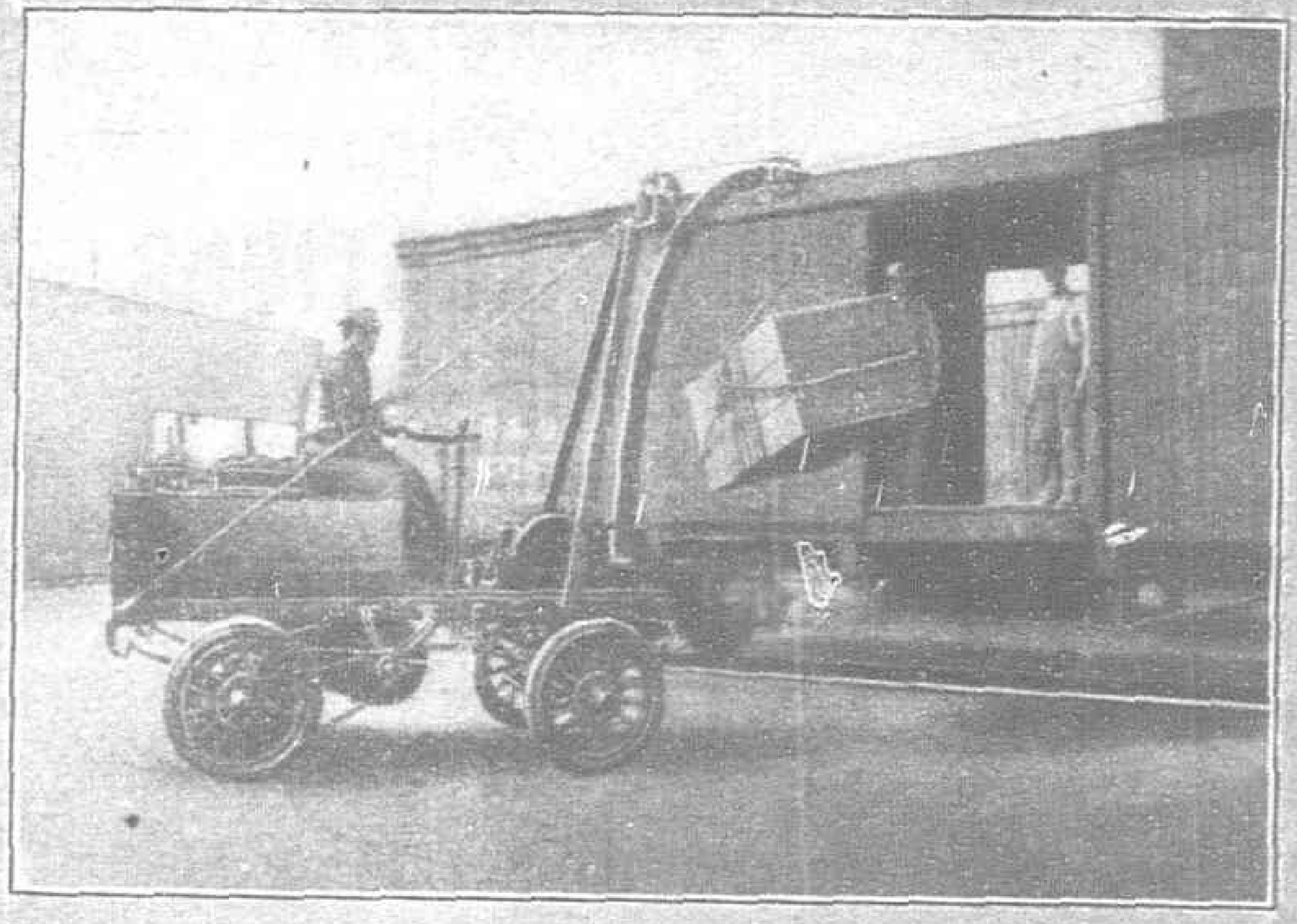

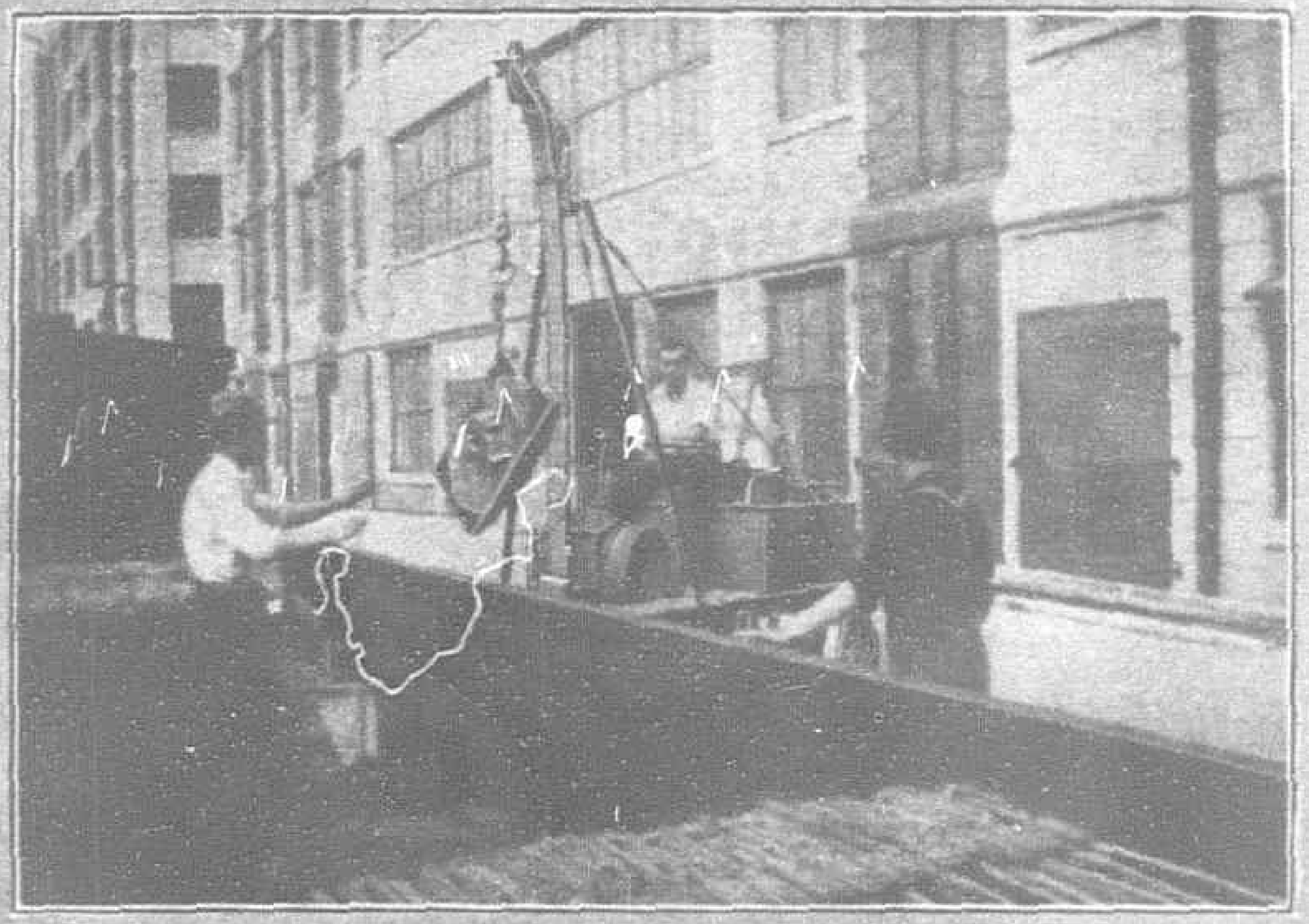

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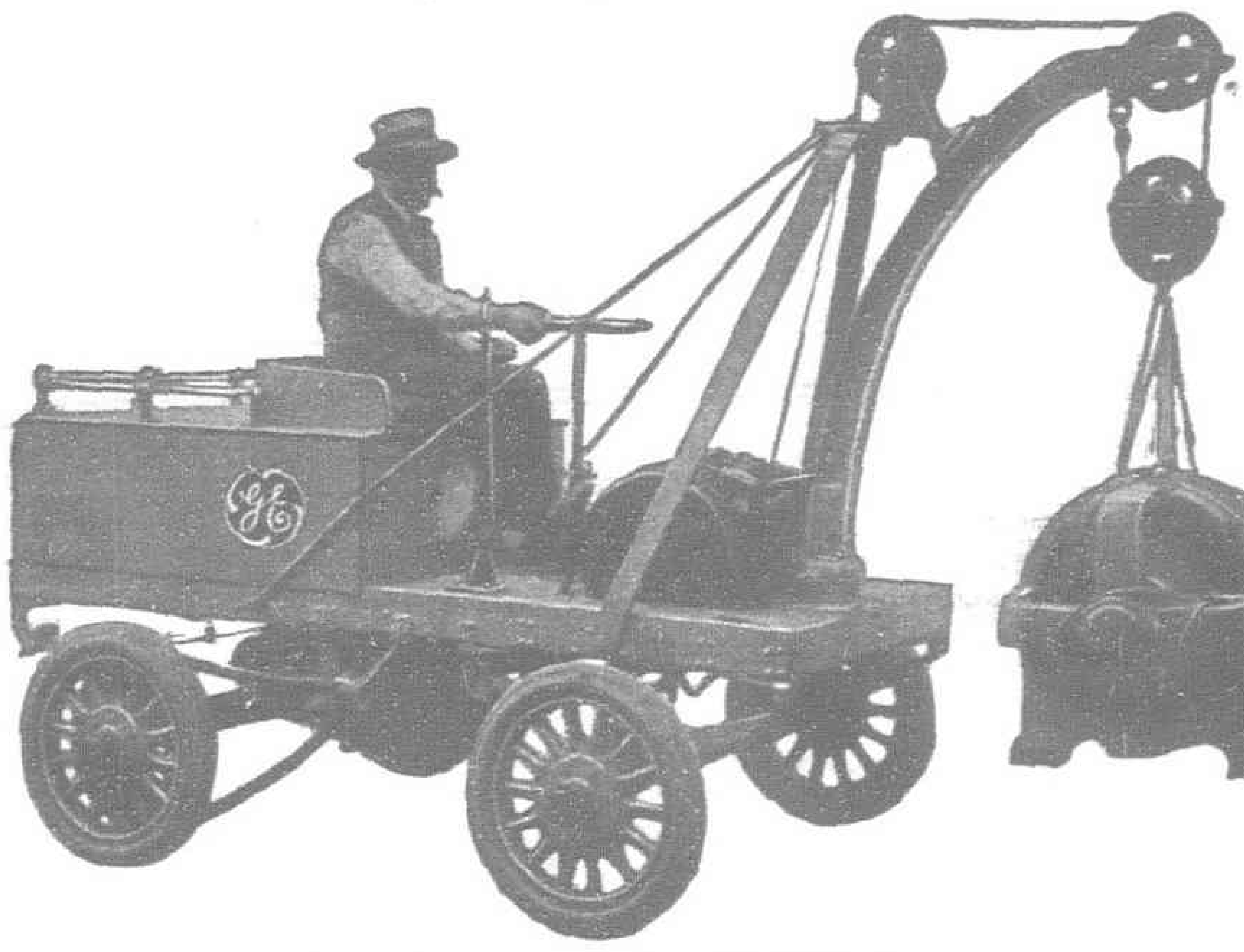

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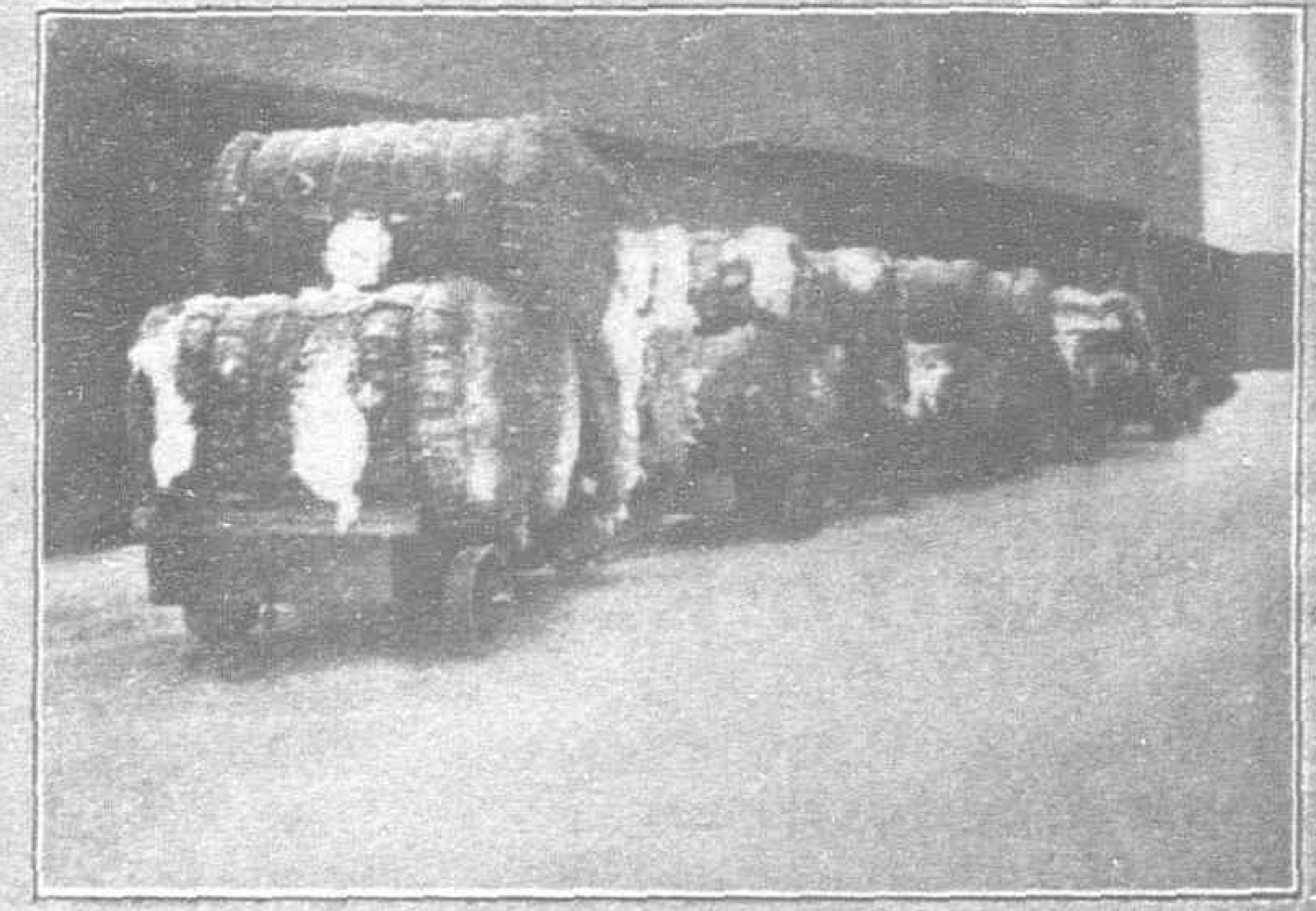

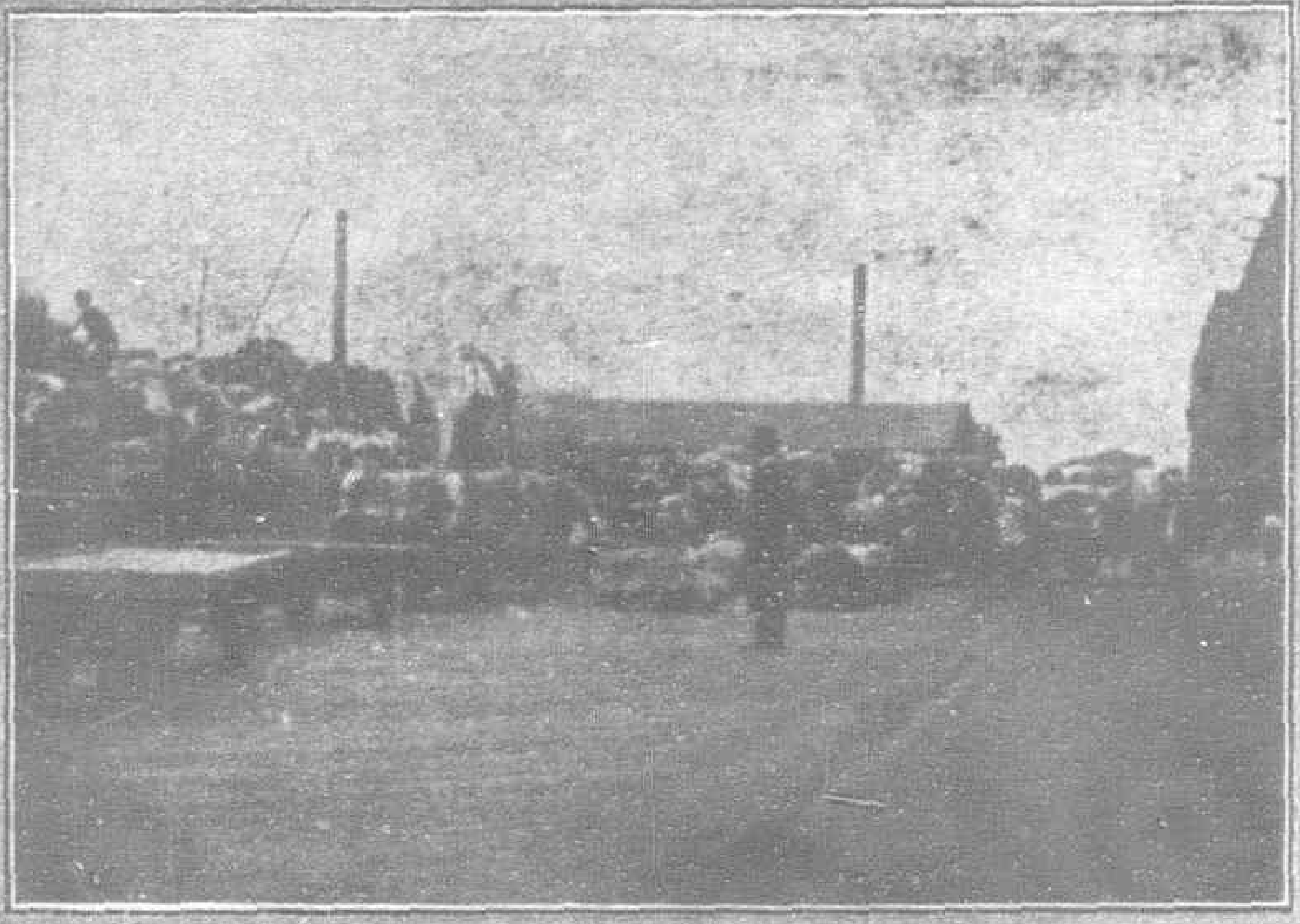

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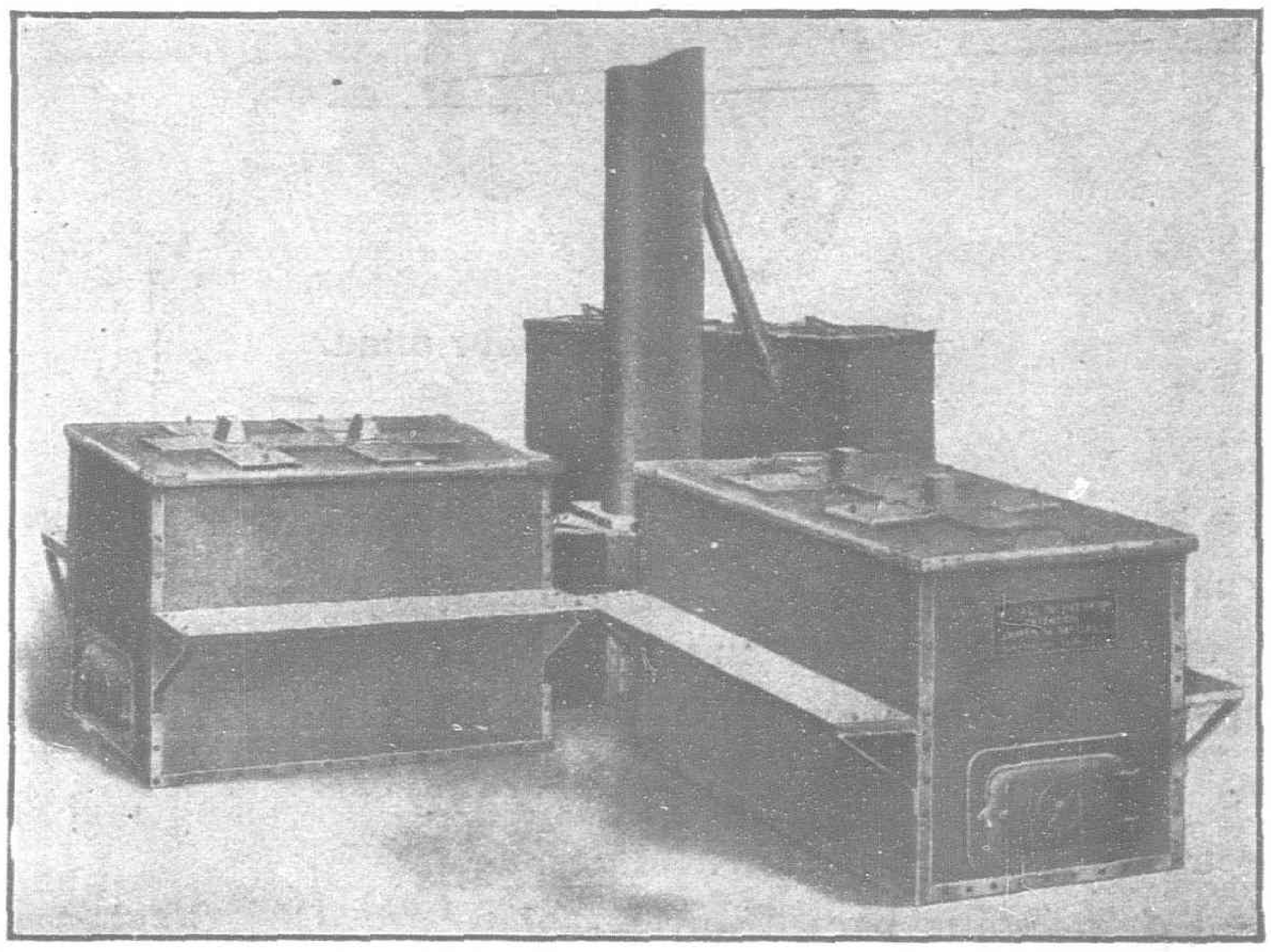

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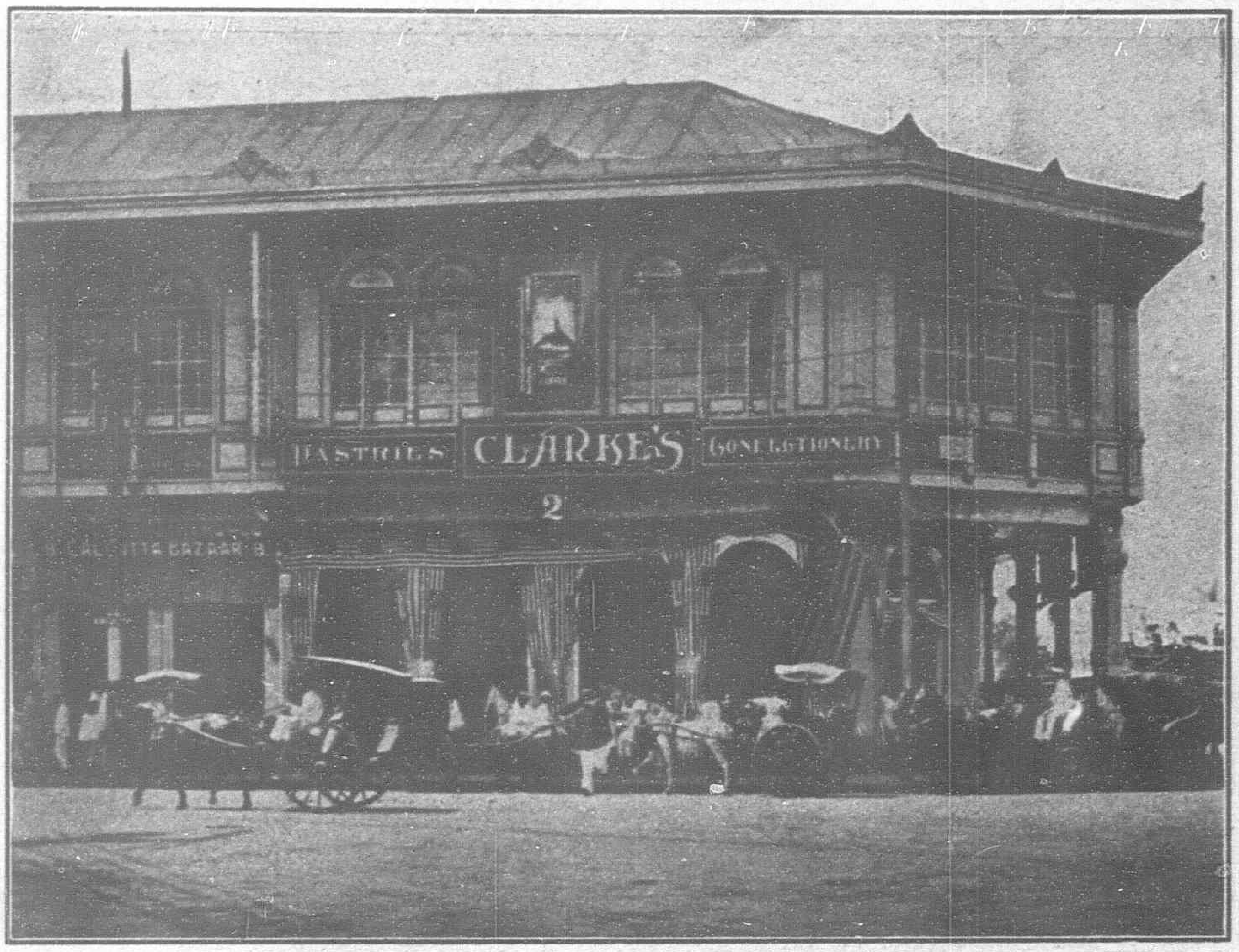

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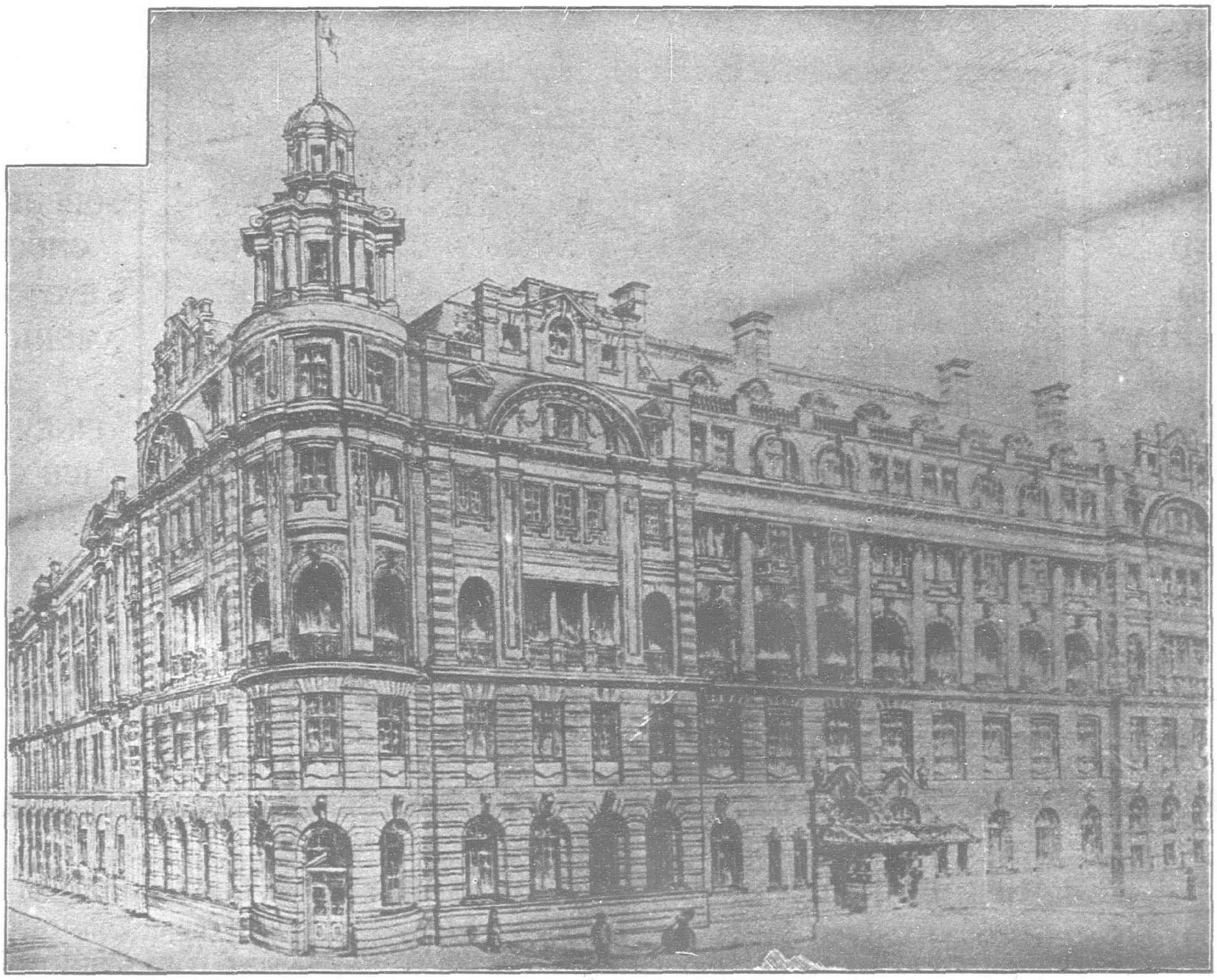

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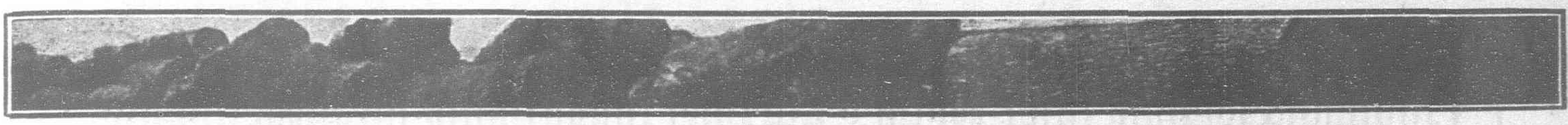

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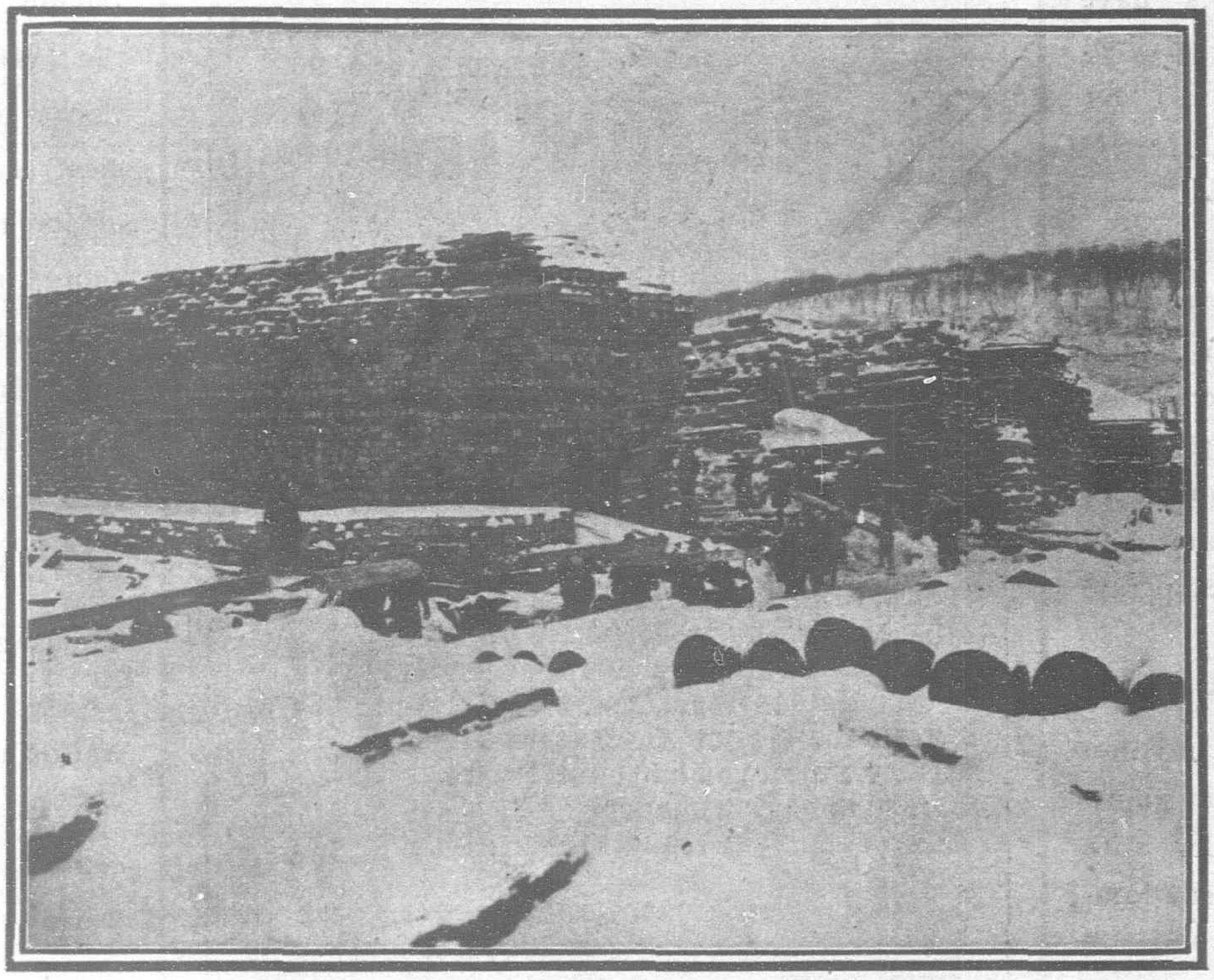

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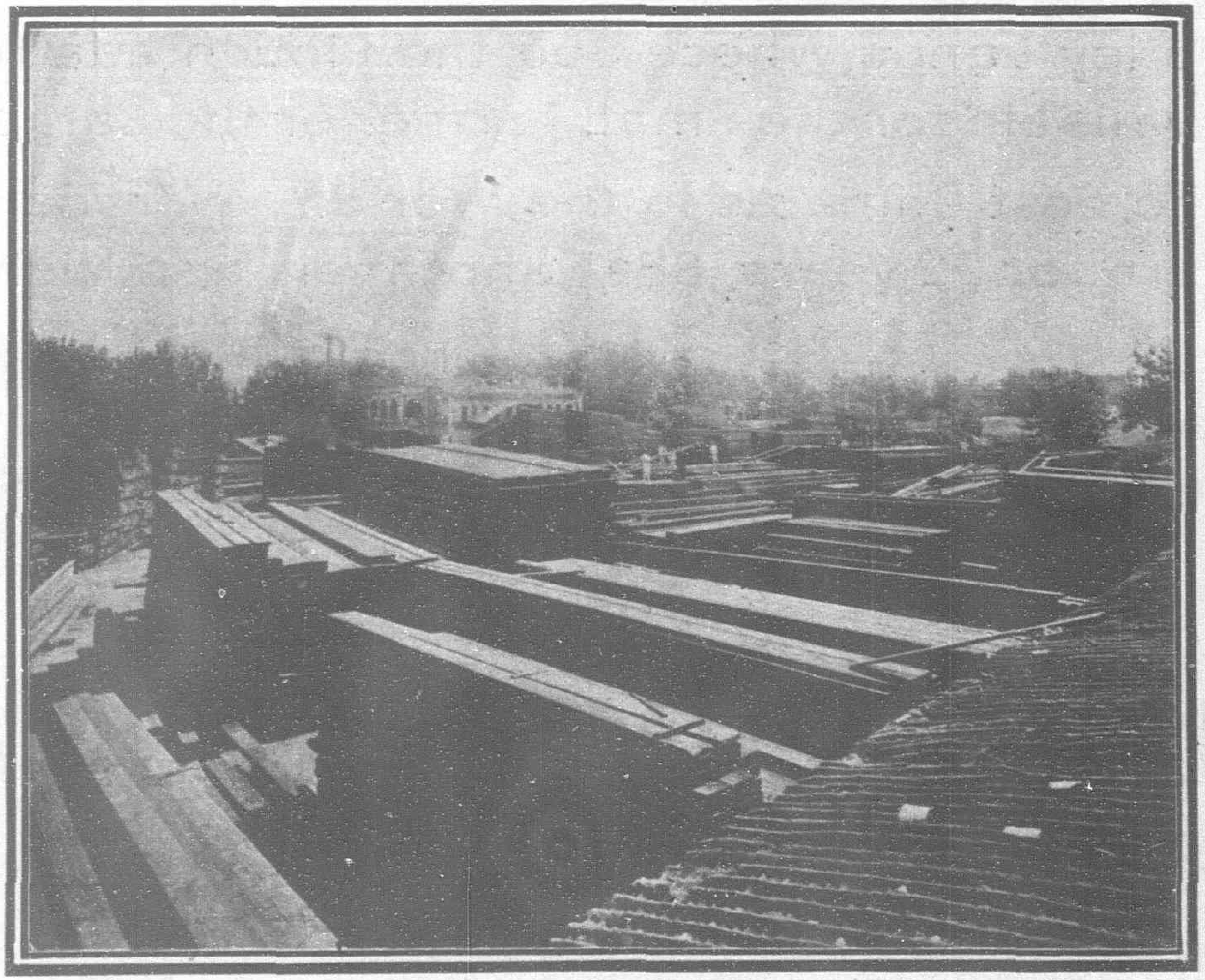

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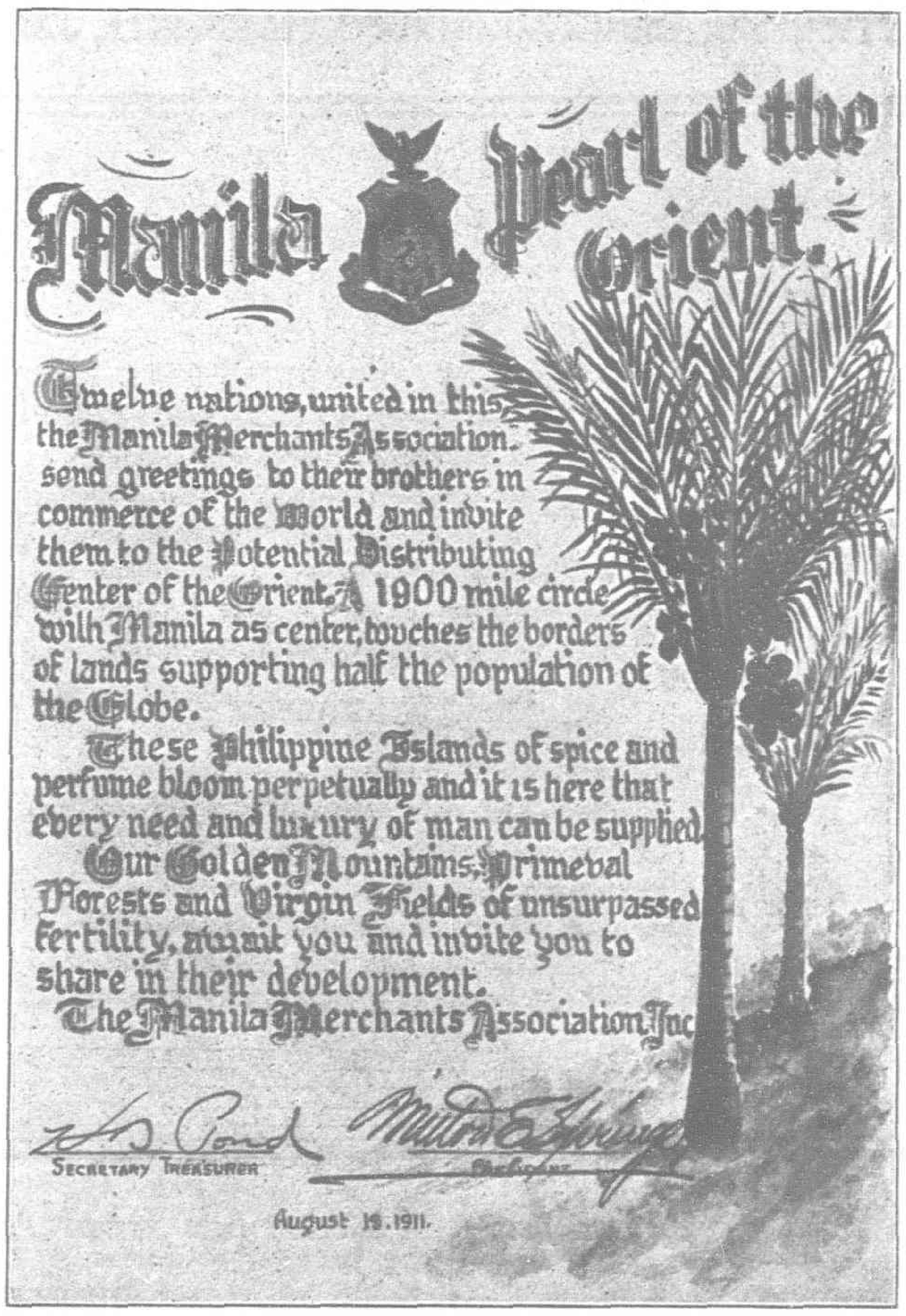

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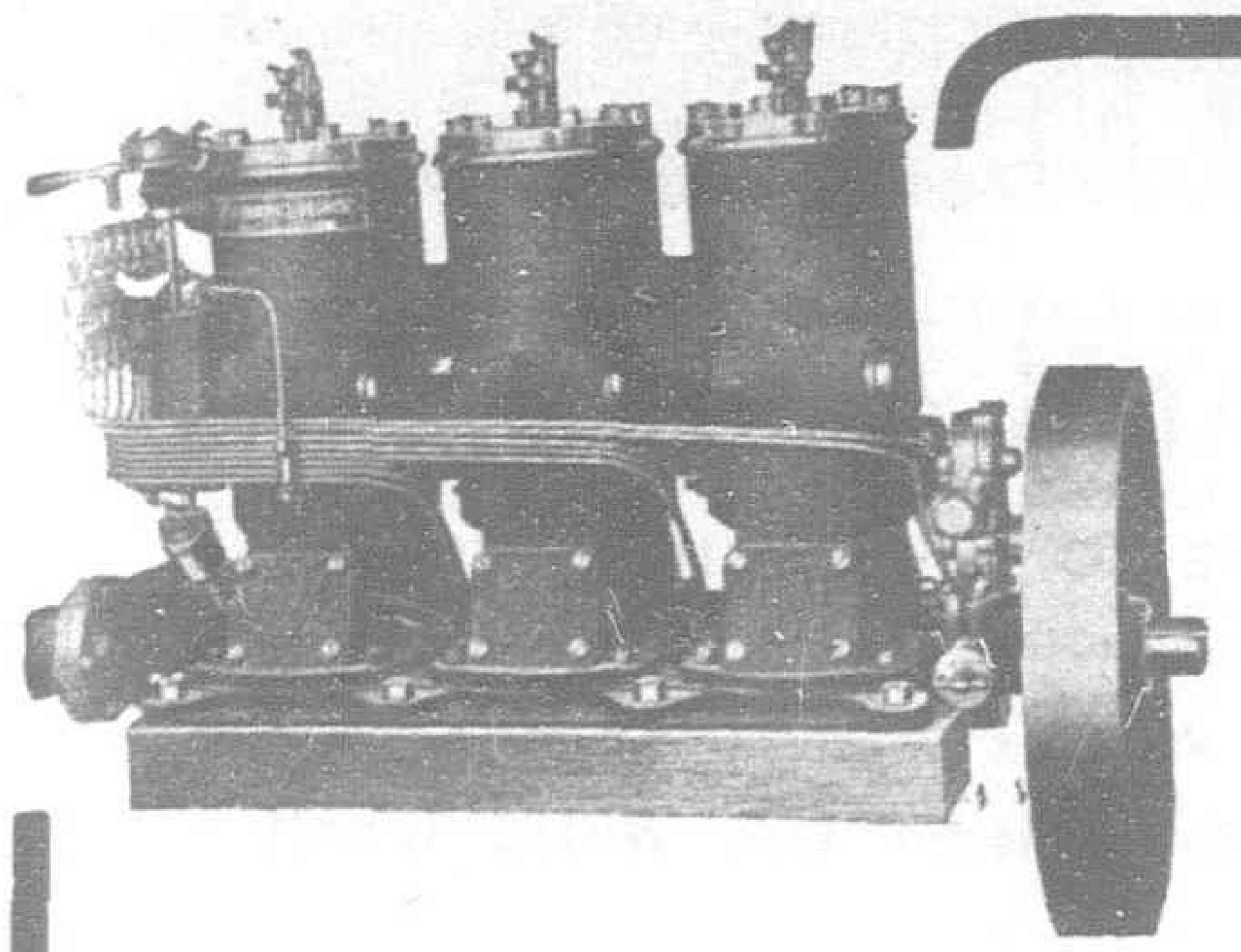

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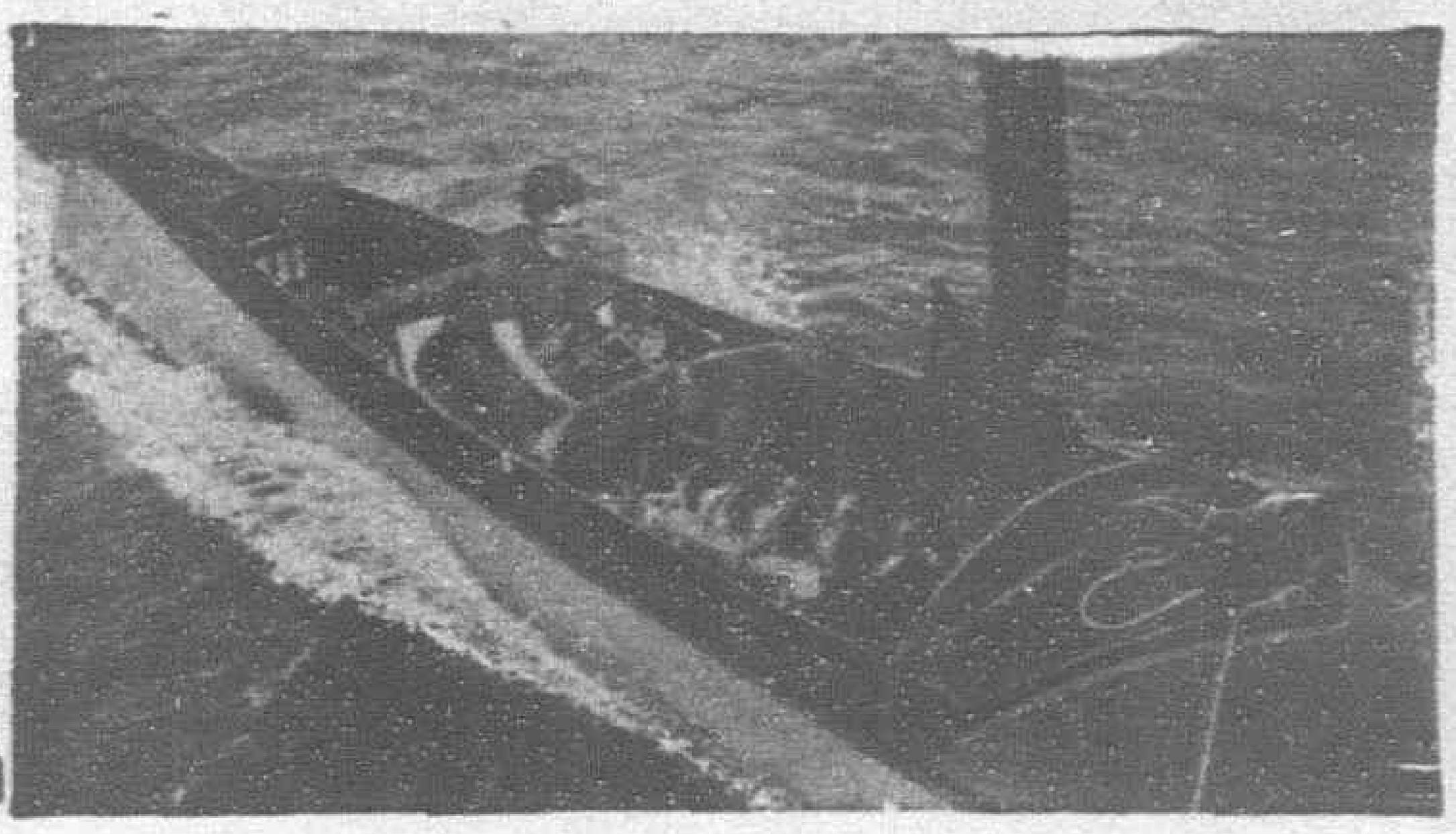

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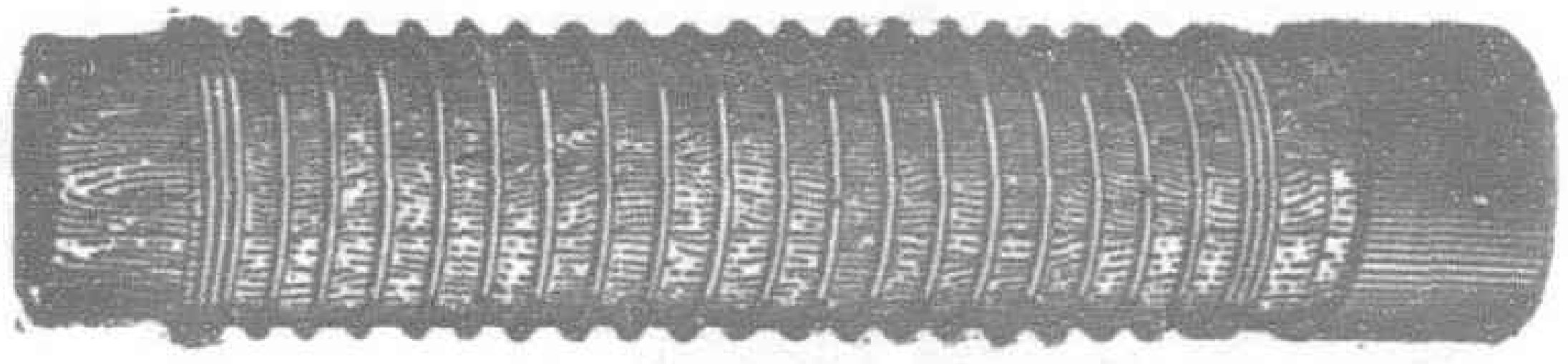

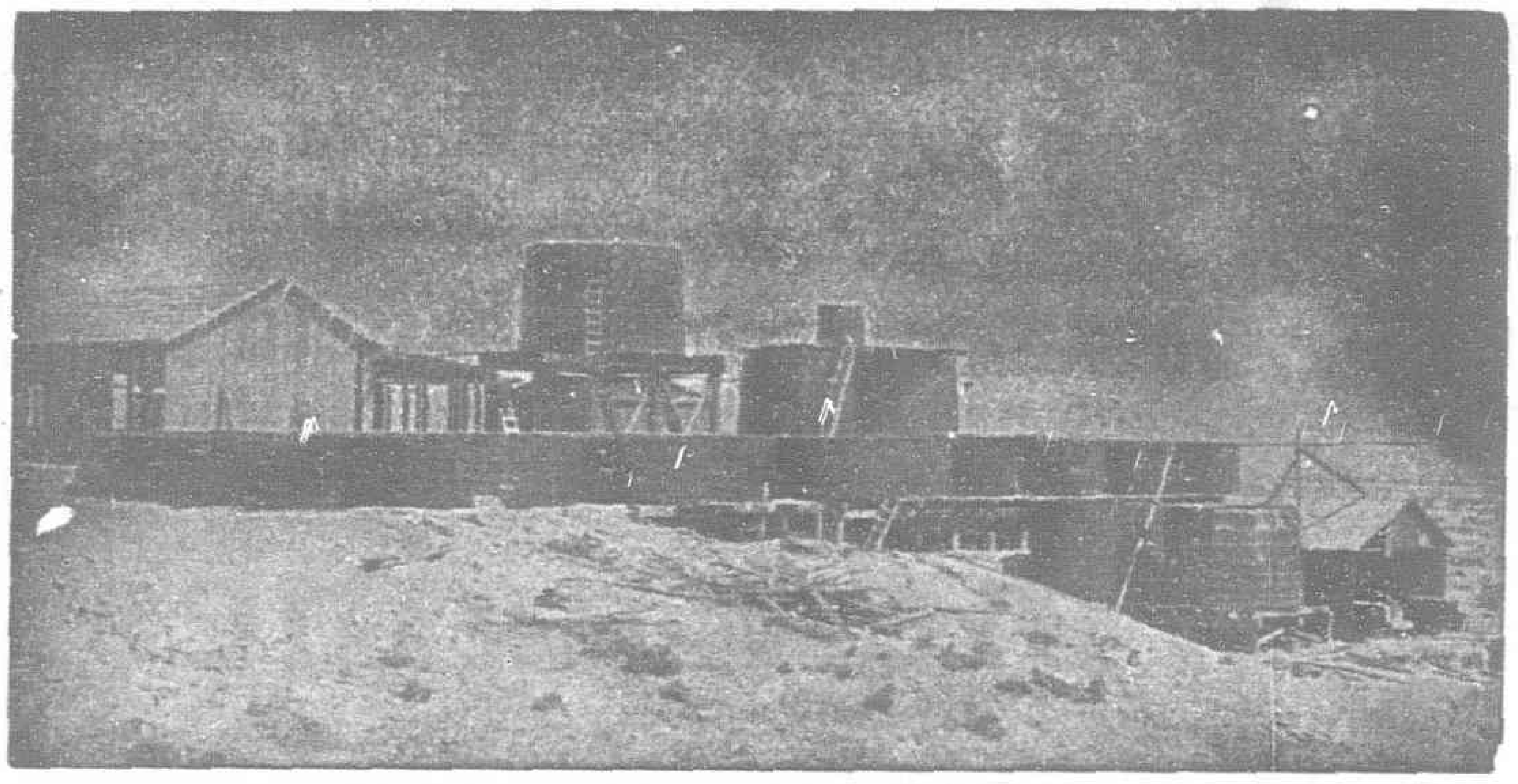

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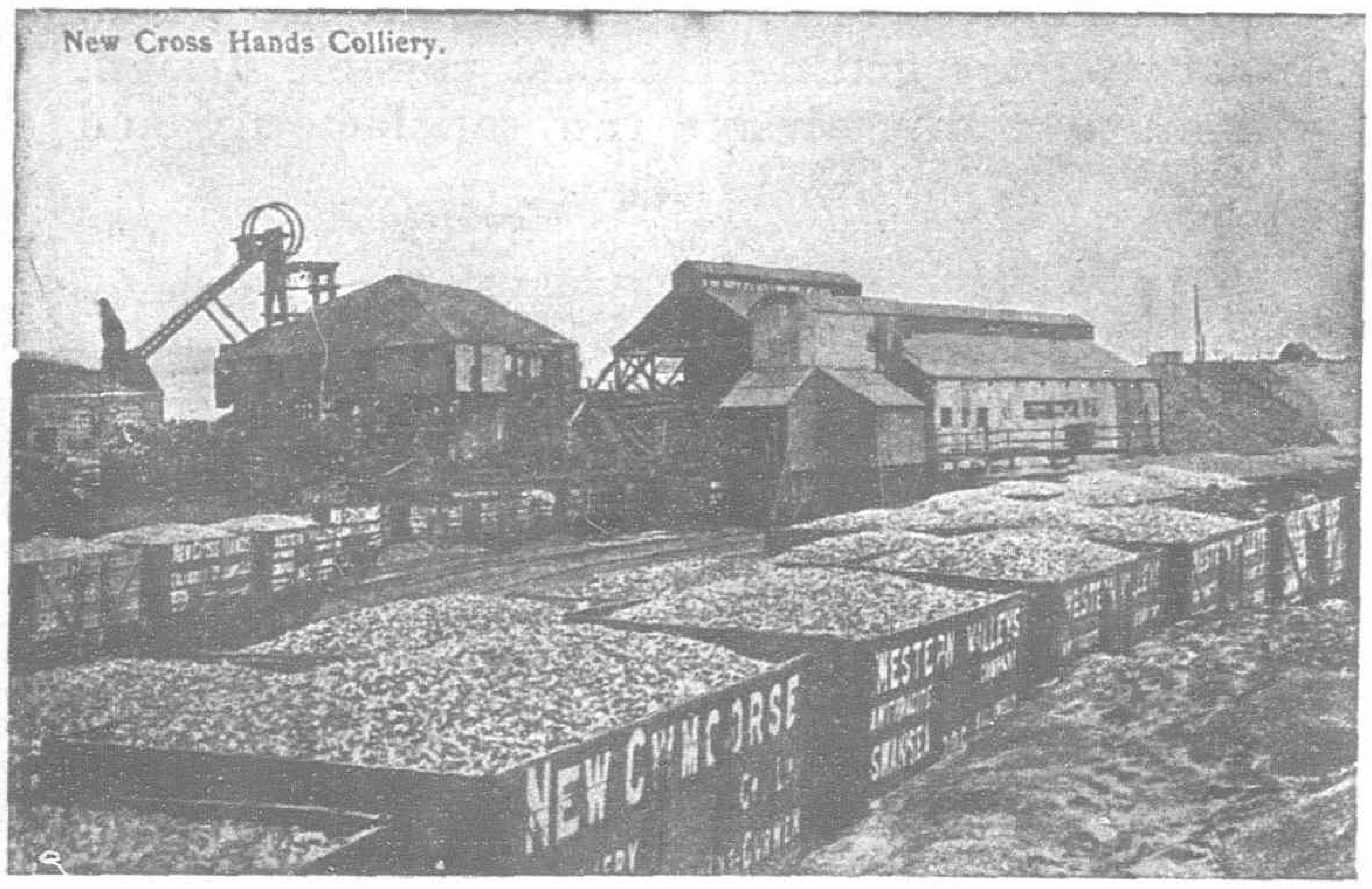
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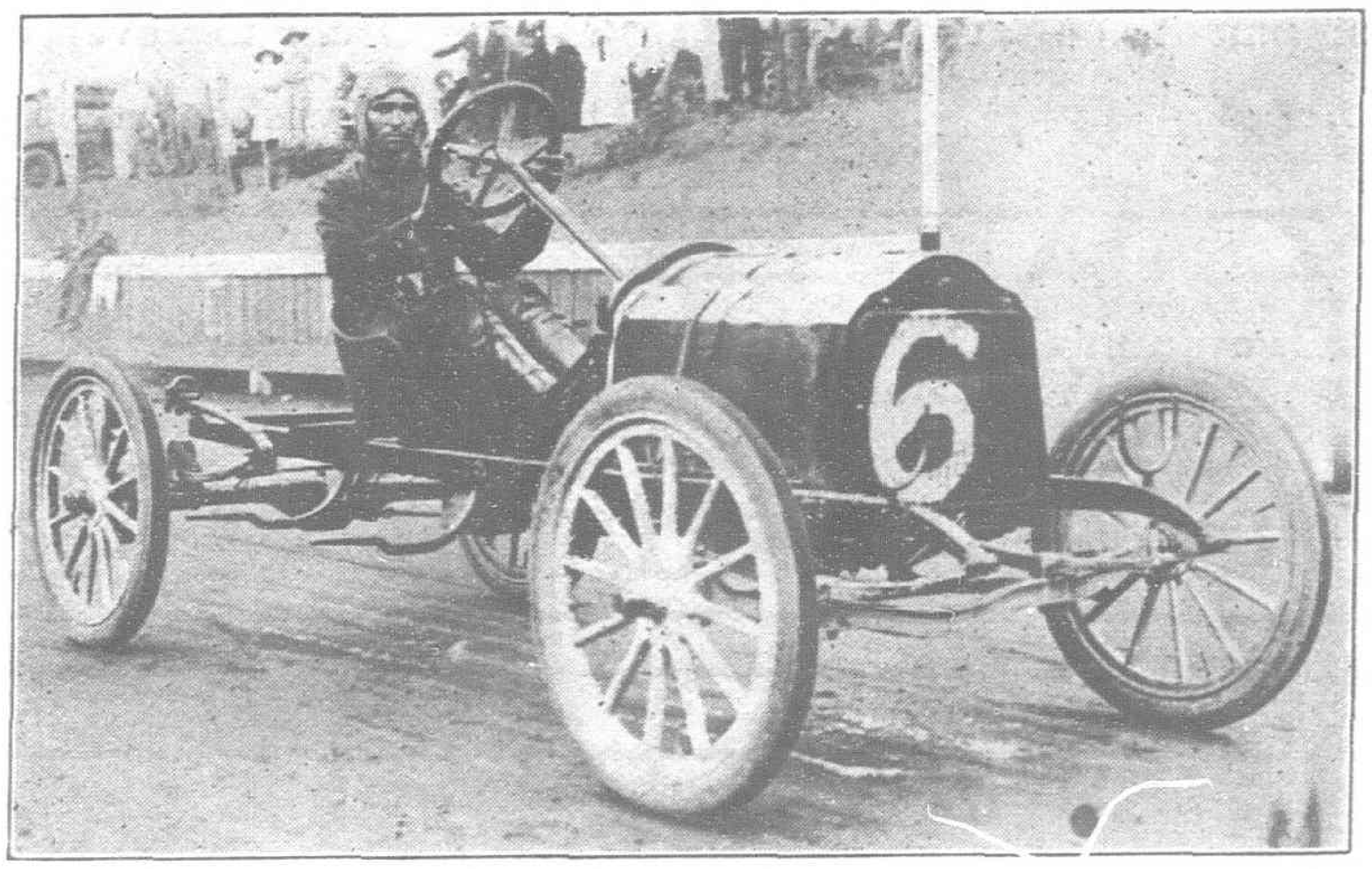

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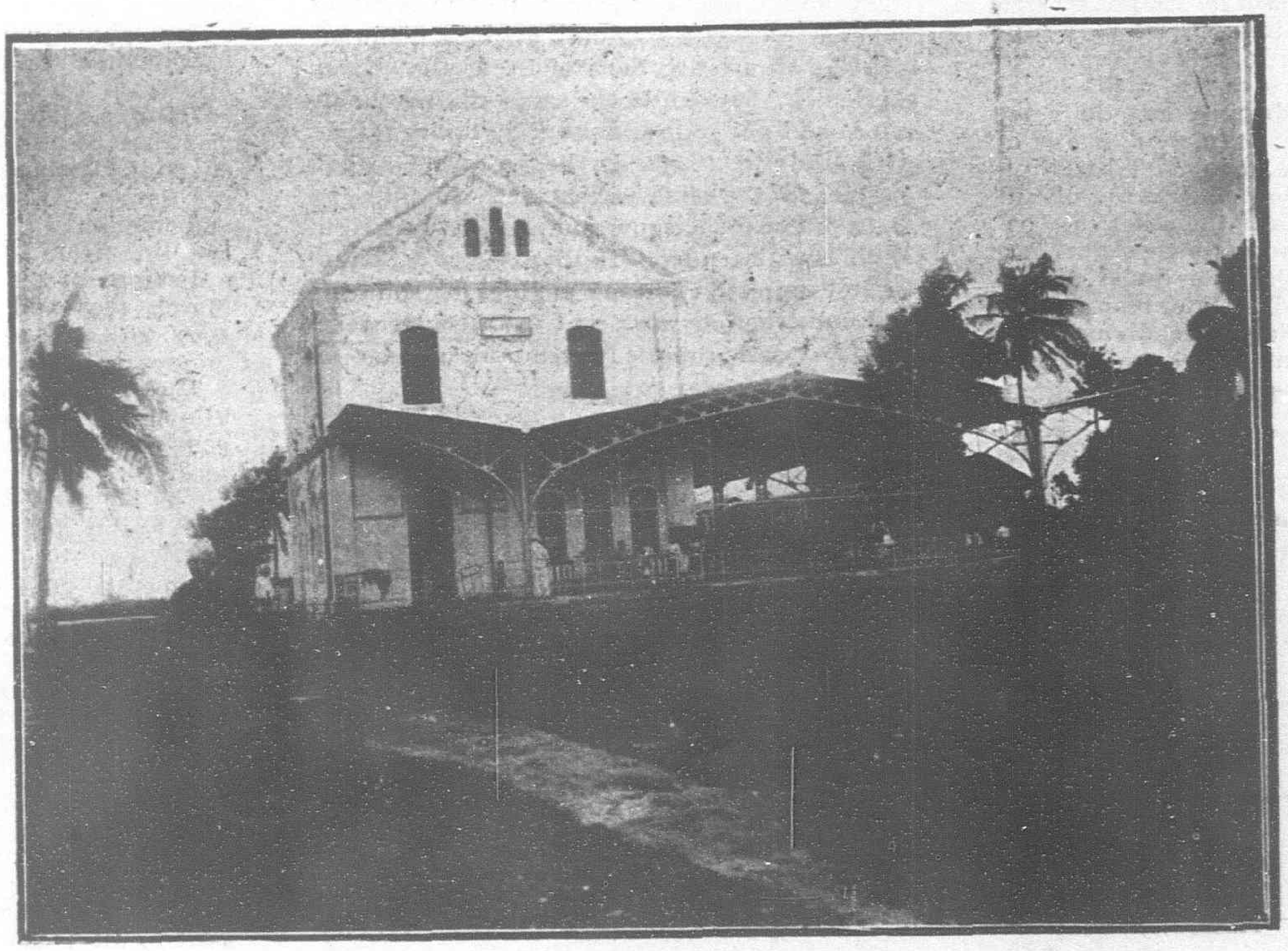
VOL. VIII. MANILA, P. I., SHANGHAI, AND YOKOHAMA, JANUARY, 1912 No. 8.

THE ROYAL STATE RAILWAYS OF SIAM

Through the courtesy of Director General L. Weiler of the Royal State Railways of Siam we are in receipt of the report on the traffic of the different lines for the year ended March 31. 1911, which was submitted to His Majesty the King of Siam by H. R. H. Prince Nares Vararidahi, Minister of Public Works. The revenue for the year showed a marked increase over the previous term, the receipts amounting to Ticals 4,526,765 in 1910-11, compared with Ticals 4,303.692 in 1909-10. The expenditures for the year amounted to Ticals 1,788,496 compared with Ticals 1,706,202 in 1909-10 while the net earnings for the year 1910-11 reached Ticals 2,738,269, compared with Ticals 2,597,490, an increase of 5.42%. The ratio of expenditure to gross receipts in 1910-11 was 39.51% and the previous year 39.64%, a reduction of 0.13%.



Courtesy of The Director General.
STATION AT PETRIU, EASTERN VIEW ROYAL STATE RAILWAYS OF SIAM

The kilometrage of open line of the Royal State Railways during the year was 932.1 kilometers, the same as for the previous term. Of these lines there are 151.4 kilometers of meter gauge and the balance standard gauge. The meter gauge prevails on the Royal Bangkok-Noi-Petchaburi line a distance of 151.4 kilometers while the balance of 780.7 kilometers is standard gauge. The latter includes the Northern line from Ban Phaji to Pang Tong Pung, a distance of 446.7 kilometers; the Bangkok-Korat line which runs north from Bangkok as far as the junction with the Ban Phaji Pang Ton Pung line at Ban Phaji and then eastward to Korat, a distance of 264 1 kilometers; the Bangkok-Petriu line from Bangkok eastward to Petriu a distance of 63.4 kilometers and a small branch line, 6.3 kilometers in length; from the Bangkok-Petriu line making connection with the station on the Menam River.

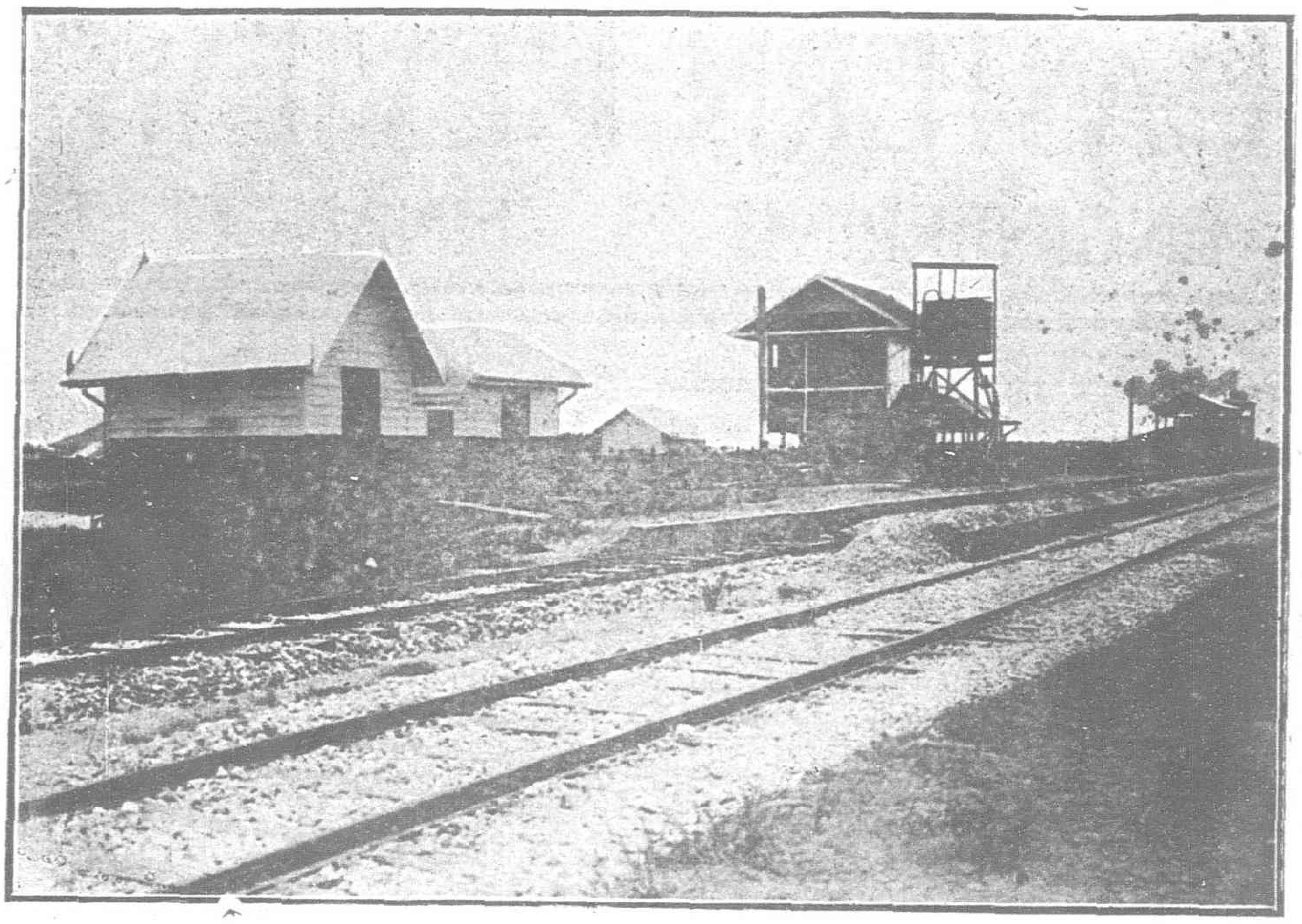
A table submitted places the entire original cost of construction of all lines, 913.1 kilometers in all, including both gauges, at Ticals 56.598,974 or Ticals 61,985 per kilometer. The 151.4 kilometers of meter gauge cost Ticals 8,115,878 or Ticals 53,606 a kilometer while the total cost of 761.7 kilometers of standard gauge, including the outlay of Ticals 1,230,737 for central shops at Makasan, was Ticals 48,483,096 or Ticals 63,519.83 per kilometer. The lowest cost of standard construction by kilometer was Ticals 48,210 on the section between Ban Phaji and Lopburi, a distance of 42 5 kilometers, and the most costly was the River Line covering a distance of 6.5 kilometers at Ticals 94,484 per kilometer.

The above figures include the cost of land, earthwork, fencing, level crossings, tunnels, permanent way, telegraph, signals, line marks and permanent way huts, stations, workshops, extraordinary works, rolling stock, administration, and general expense.

The highest cost for earth and rockworks was Ticals 21,798 per kilometer on the Pitsanuloke section of the Northern line and Ticals 25,354 on the River line, but the average cost per kilometer for this work was Ticals 14,162. There were Ticals 570,899 expended in culverts and masonry for bridges of less than 10 m span representing Ticals 625 a mile of this character of construction; Ticals 1,596,535 for timber bridges at Ticals, 1,748 a mile and Ticals 3,258,091 in steel bridges including piers and abutments averaging Ticals 3,568 per kilometer of construction. Average cost of bridge construction varied little on the different lines, the lowest being on the Sawankaloke section of the Northern line at Ticals 2,116 per kilometer and the highest on the River line at Ticals 8,078 per kilometer while the cost was Ticals 7,899 on the Petchaburi section.

The total administration cost during construction is represented by Ticals 5,270,257 or 9.4% of the total outlay.

LOCOMOTIVES.—There are 67 locomotives in service in all, of which eight are meter gauge.



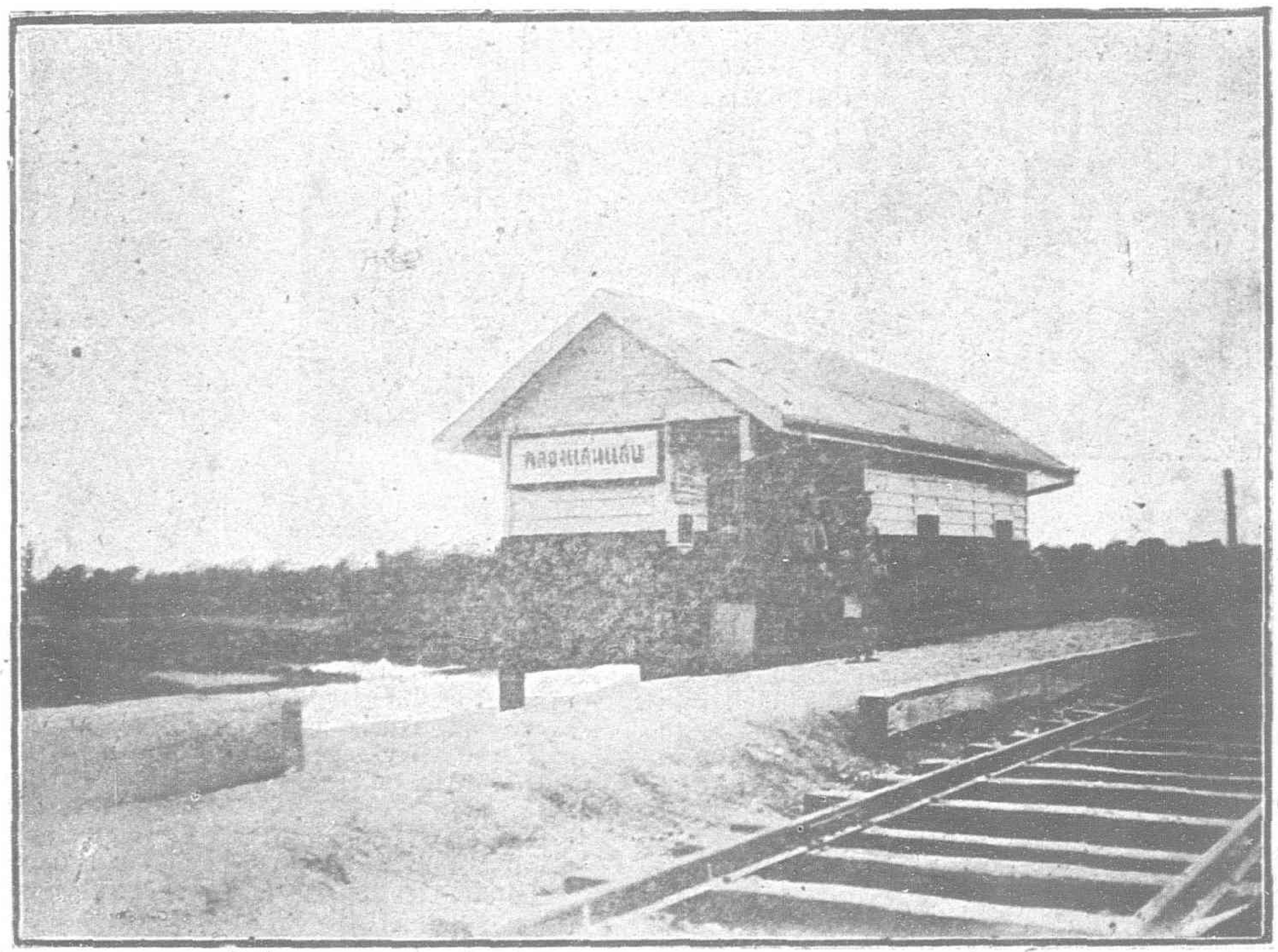
Courtesy of the Director General.

STATION AT HOOA TAKEH WITH TYPE OF PERMANENT WAY INSPECTOR'S QUARTERS, PETRIU LINE.—ROYAL STATE RAILWAYS

Two of the latter are utilized for freight service and six for passenger trains. These were supplied by Messrs. Kraus & Co. in Munchen. The freight locomotives (bogie engine with tender) are equipped with outside cylinders, diameter 380 mm.; length of stroke, 540 mm.; diameter of wheels, leading, 680 mm., driving and trailing 1100 mm. One of these locomotives was placed in commission in 1900 and the other in 1902.

There are four locomotives for passenger service of the same type with the cylinder diameter and stroke 260 mm. and 500 mm. respectively and the driving and trailing wheel diameter increased to 1350 mm. put into commission in 1902 and two added in 1903.

On the standard gauge there are two shunting and construction works tank engines manufactured by Hunslet & Sons of Leeds that began service in 1893, while the same company supplied two light train and shunting tank engines, with tender in 1895. In the same year two tank engines for the same service were supplied by Dubs & Co. of Glasgow and in 1896 two freight engines with tender. In 1897 Pecket & Sons of Bristol supplied two tank engines for shunting and construction work and in 1910 Henschel & Son, Cassel, supplied three tank engines for the same purpose.



Courtesy of the Director General.

STATION AT KLONG SENSEP, KM. 11, PETRIU LINE.—TYPE OF STOPPING PLACE, ROYAL STATE RAILWAYS

The Hannoversche Machinen-Fabrik has supplied the 24 locomotives for passenger service on the standard gauge. These have outside cylinders with a diameter of 380 mm.; length of stroke 500; diameter of leading wheels 850 mm. and of driving and trailing wheels, 1400 mm. The first two went into commission in 1898, two in 1900, two in 1903, six in 1905, three in 1907, six in 1908 and three in 1910. This company also supplied thirteen locomotives for the mixed and freight service of similar type with the increase in the diameter of cylinders and length of stroke to 450 mm. and 630 mm. respectively. Messrs. Krans & Co. also supplied eight locomotives for the mixed and freight service with outside cylinders 440 mm. diameter and a stroke of 540 mm. The diameter of the leading wheels is 920 mm. and the driving and trailing wheel diameter 1260 mm.

ROLLING STOCK.—Passenger coaches include two private saloon carriages for His Majesty, and in all number 178 on the standard gauge. Of these there are two inspection saloon, three saloon, seven first and second class composites, four first class and guards composites, fifteen first and third class composites, twenty-four second and third class composites and 121 third class. Including all other cars adapted for freight of all kinds there are 560, besides 296 ballast wagons.

On the meter gauge there are 33 passenger coaches including one private saloon for His Majesty, four saloon cars, three first and second class composites, four first and second class composites, four second and third class composites and twenty-two third class. The freight wagons number 83 and ballast cars 30. The carrying capacity of the passenger composite coaches run from 9 to 40 first class, 7 to 23 second class and 6 to 80 third class according to accommodation in the different combinations for the several classes.

History.—The first construction undertaken was that of the line from Bangkok to Korat covering a distance of 264.1 kilometers of standard gauge. It was commenced in March 1892 and completed in November 1900. The northern line from Ban Phaji to Pang Ton Phung, a distance of 446.7 kilometers, was begun in March 1898 and opened to traffic in August 1909 with still 19 kilometers remaining under temporary construction.

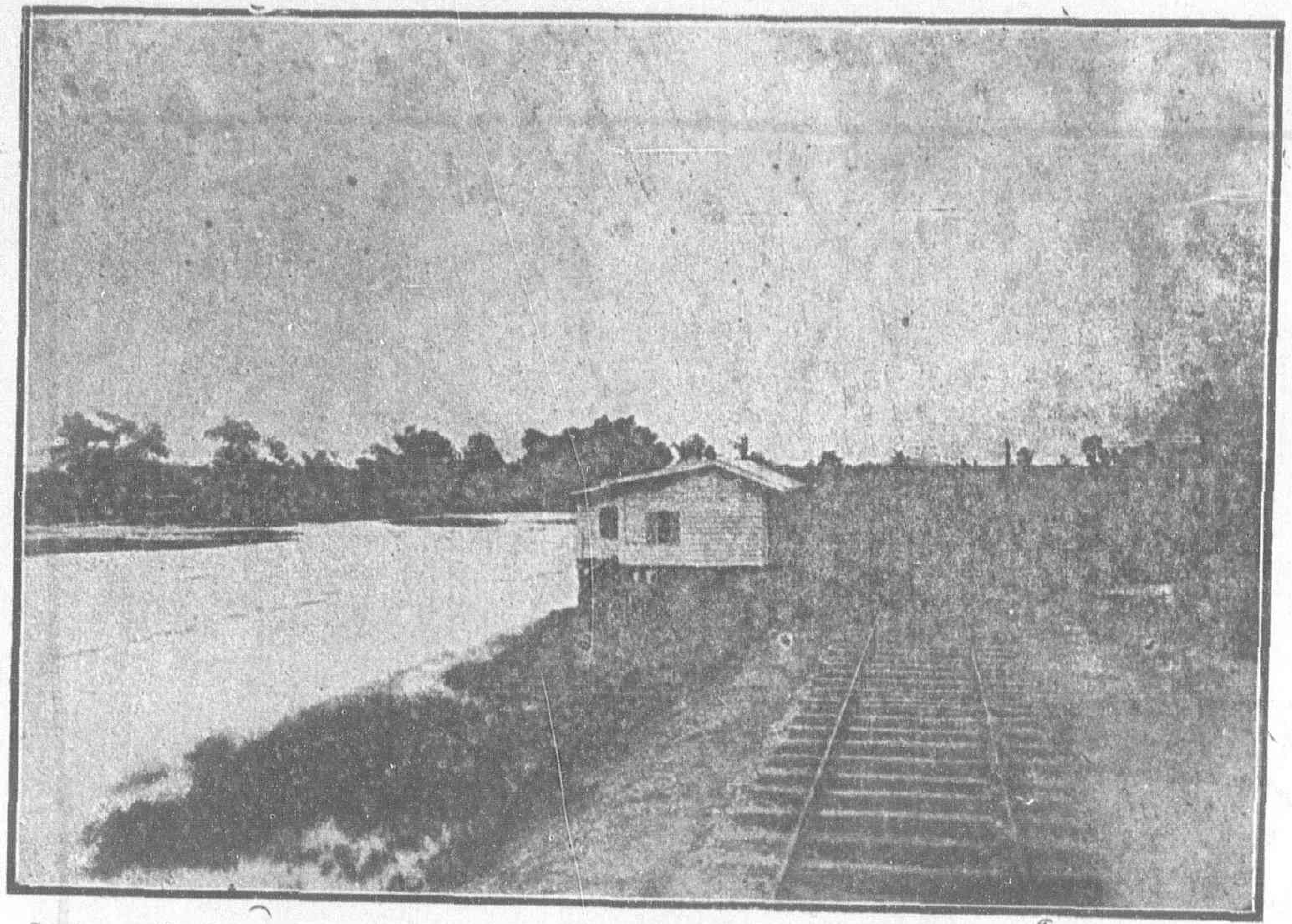
The Bangkok-Petriu or Eastern line, 63.4 kilometers in length, was commenced in November 1905 and opened for traffic in January, 1908.

The Bangkok-Manam River, 6.5 kilometers, was begun in January 1907 and completed in February 1910.

On the Bangkok Noi-Petchaburi (meter gauge) 151.4 kilometers, construction began in February 1900 and was opened for traffic in April 1903.

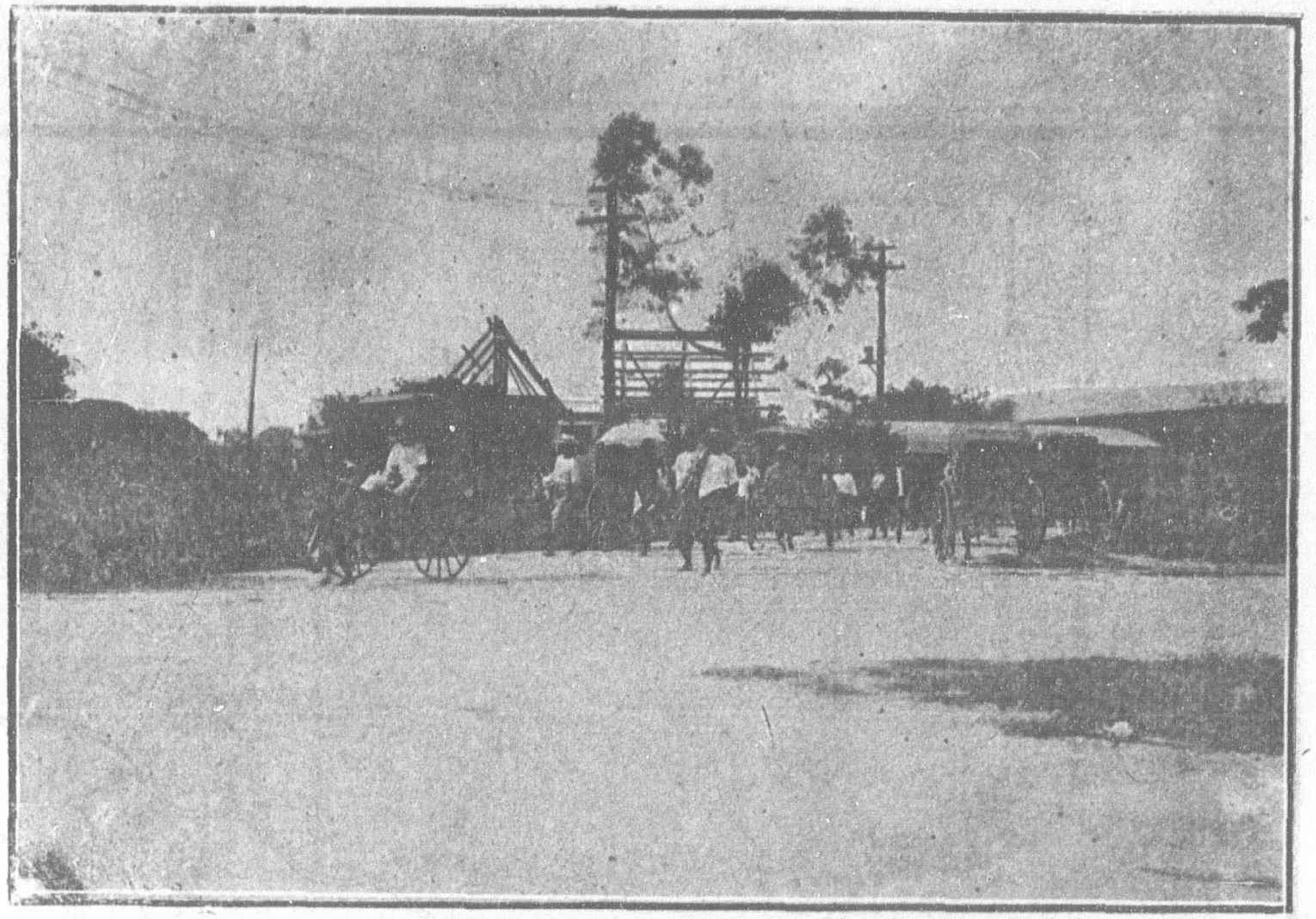
New Works.—During the year 1910–11 under the head of New Works, the sum of Ticals 339,167 was spent. The extension of station yard at Bangkok for the year cost Ticals 217 972 making Ticals 760,582 spent on this work up to the end of the year on a total estimate of Ticals 1,230.000. The sum of Ticals 104.732 was spent during the year in the completion of the new central workshop at Makasan which cost in all Ticals 1,230.737. These shops are well equipped with all modern machinery and appliances to meet any emergency of the service and electric power is utilized.

Among the other expenditures were the construction of quarters for officials and employes at Bangkok, Ban Dara, and Utaradit; the remodelling of Korat station to accommodate military transports and increased traffic. A number of godowns were built along the river bank at River Stations to afford facilities for transhipment of freight from rail to seagoing vessels and vice versa and a commencement has been made on works to protect the banks of the river from washouts. The construction of a subway at the Ban Phaji junction is under way for the protection of passengers previously obliged to cross the tracks and to increase the efficiency of the control service. The installation of vacuum brakes on passenger trains was further advanced last year by an expenditure of Ticals 9,633 and this work will continue until the entire service is equipped. The completion



Courtesy of The Director General

TYPE OF PERMANENT WAY COOLIE SHED OF THE PETRIU LINE, ROYAL STATE RAILWAYS OF SIAM

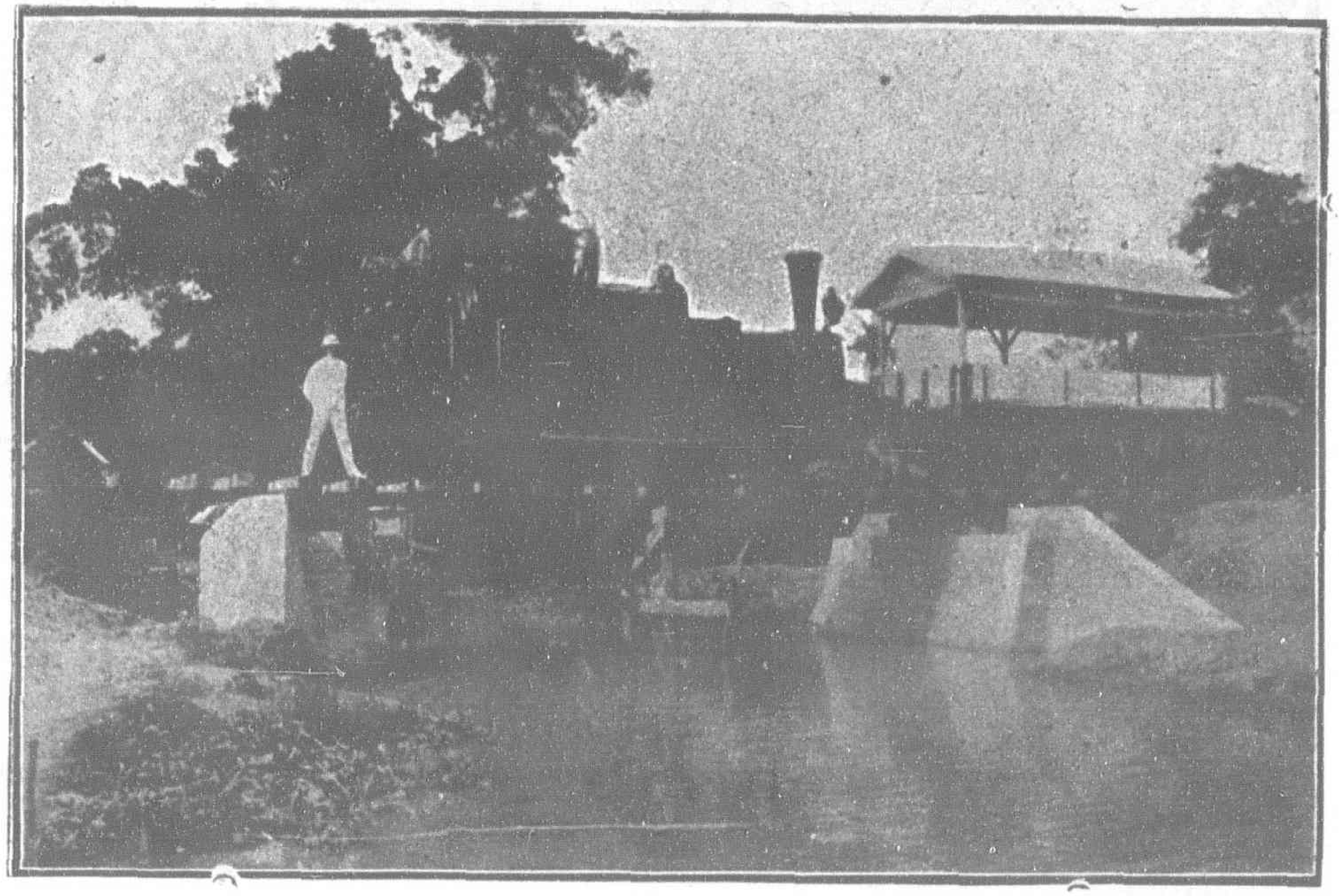


Courtesy of The Director General

AFTER ARRIVAL OF A TRAIN AT BANGKOK TERMINUS, ROYAL STATE RAILWAYS

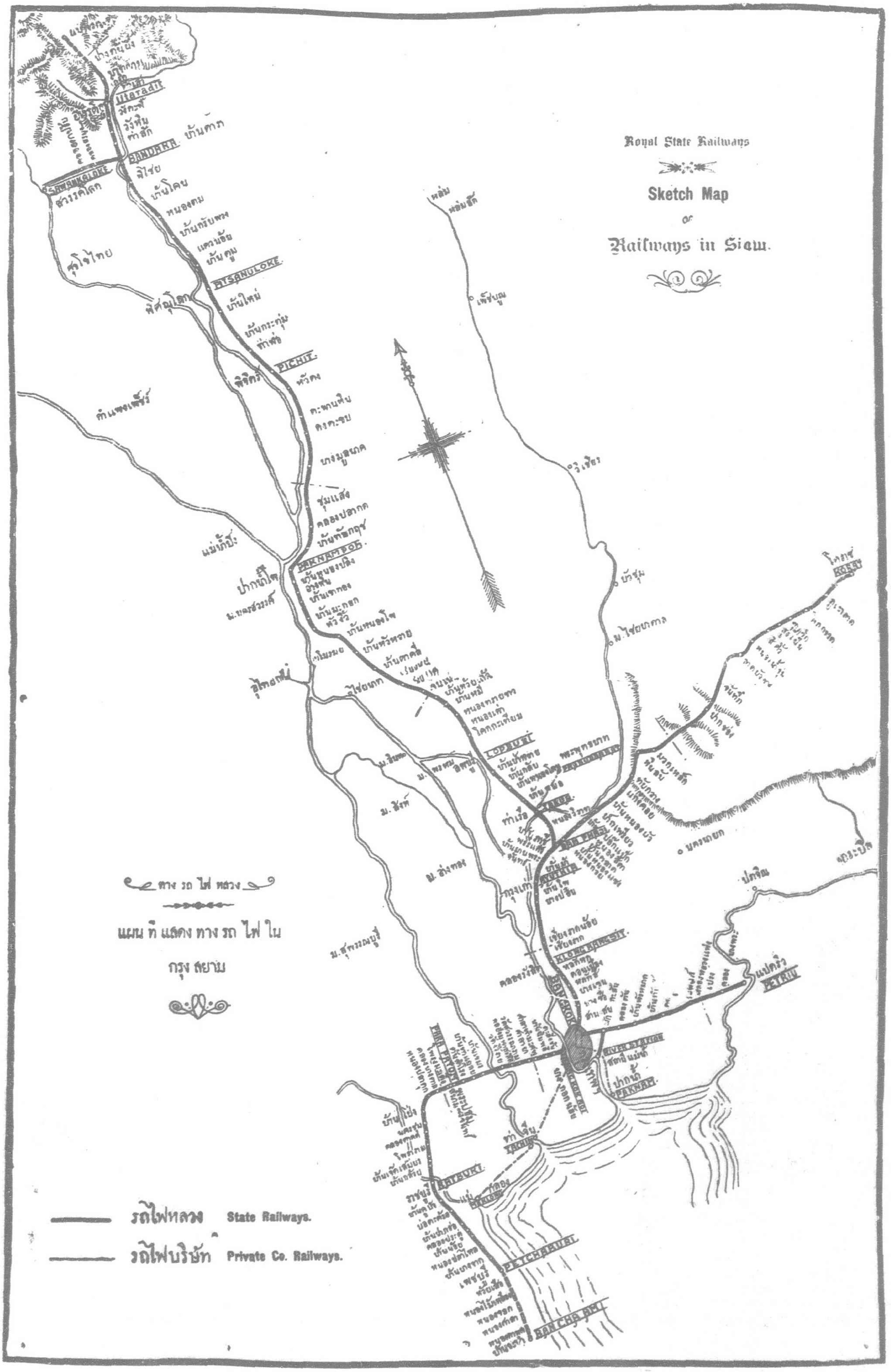
Courtesy of The Director General

TEMPLE AT PITSANULOKE, KM. 293 OF NORTH LINE, ROYAL STATE RAILWAYS



Courtesy of The Director General

TEMPORARY BRIDGE AT BANG GAPIH, 10 M. SPAN, KM. 76, PETRIU LINE, ROYAL STATE RAILWAYS


Royal State Railways
Sketch Map of Railways in Siam.
ทาง รถ ไฟ หลวง
แผน ที่ แสดง ทาง รถ ไฟ ใน กรุง สยาม
รถไฟหลวง State Railways.
รถไฟบริษัท Private Co. Railways.
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BANDARA
SAWANKALOKE
PITSANULOKE
PICHIT
PAKNAMPOH
LOPBURI
AYUTHIA
BAN PHACHI
KLONG RANGSIT
BANGKOK
RIVER STATION
PAKNAM
PETRIU
KORAT
PHRA PATOM
TACHIN
MEKLONG
RATBURI
PETCHABURI
BAN CHA AM

of a stone crushing plant at Chongpah quarry which has been in operation since June 1910 was another feature of the year's activity. This plant was erected to meet the demand locally for crushed rock for building and road construction.

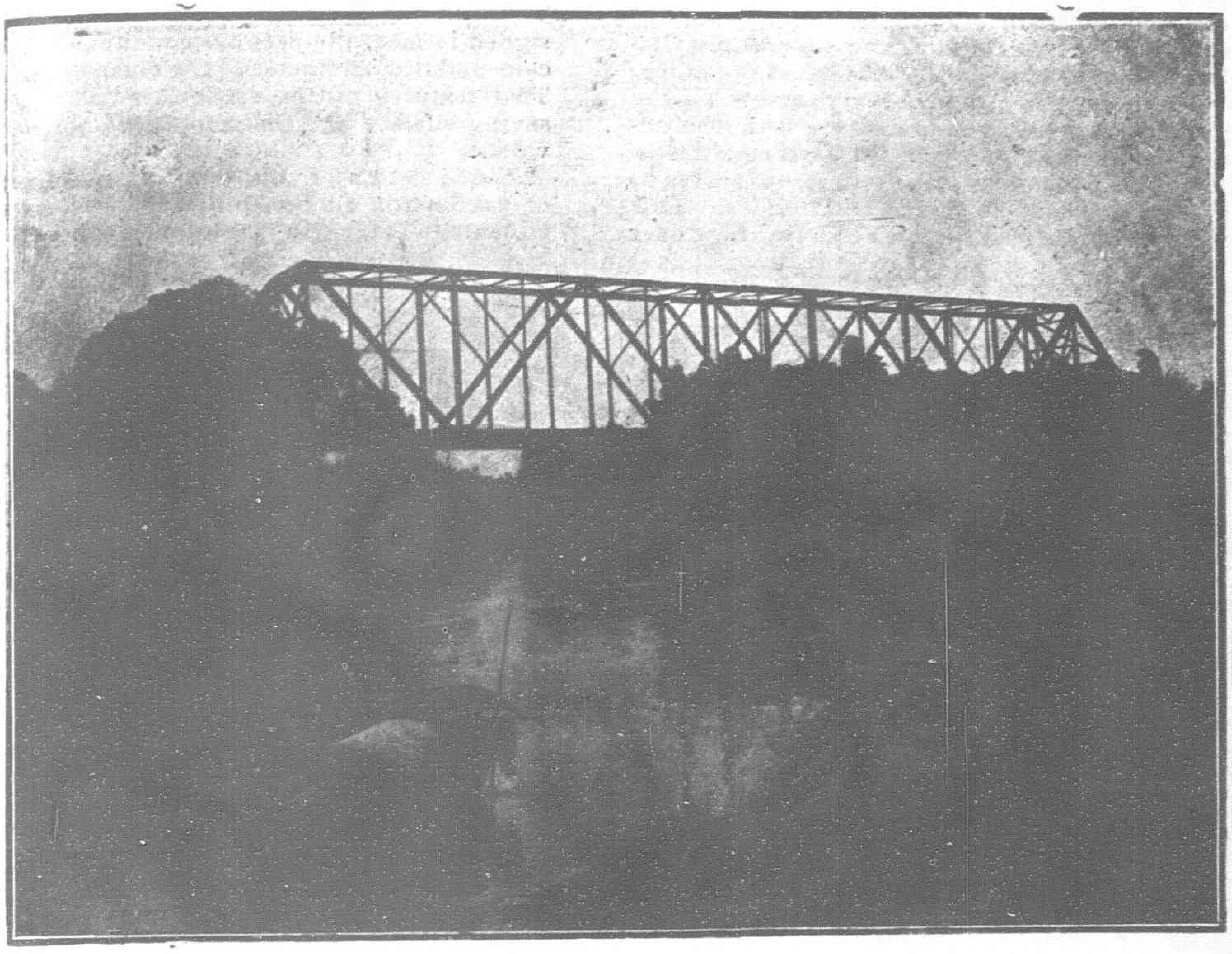
Passenger Service Receipts—Standard Gauge—During the year there were 377 passengers for reserved first class accommodation with a revenue of Ticals 3,452.30; 5,059 first class, Ticals 25,693.05; 26,386 second class, Ticals 78,290.20; third class 2,197,359, Ticals 1,994,587.09; concessions, 11,442, Ticals 9,081.15, making a total of 2,240,623 psssengers and a revenue of Ticals 2,111,103 for the year. Besides this revenue the passenger department realized Ticals 21,589.68 on luggage, special trains, etc., making a total of Ticals 2,132,691.47.

Foreign Receipts (standard gauge)—The total returns from this department amounted to Ticals 1,565,299.03 of which general goods traffic returned 1,330,309 45, live stock 175,405.60, and miscellaneous 59,583.

Passenger Receipts (meter gauge)—Total number of passengers carried was 914,537 and receipts Ticals 682,219 95 of which reserved accommodation first class was afforded 276 passengers, receipts Ticals 1,248.40, first class, 3,055, receipts, Ticals 12,111 30; second class 10,991, receipts Ticals 21,125.50; third class 893,401, receipts, Ticals 644,975, and concessions 6,814, receipts Ticals 2 758.85. For luggage special trains, etc., the revenue was Ticals 9,629.41.

Freight Receipts (meter gauge).—Goods traffic—Ticals 119,329.69; live stock, Ticals 7,008.70, and miscellaneous, Ticals 10,585.18, making a total of Ticals 129,923.57.

During the year there were few accidents with ten fatalities, two of which were passengers, three railway employes and five trespassers. The two passengers were killed while jumping on trains in motion; three employes were killed while jumping off on moving trains and the three trespassers were killed sleeping on the track, and two killed on track while trying to pass in front of moving trains. Traffic on the Northern line was interrupted between Tha Sao and Pang Ton Phung on account of high floods from 11-17 September 1910 and on January 26, 1911, the timber bridge at 76.8 kilometer Korat line was destroyed by fire causing heavy delays in despatch of trains.



Courtesy of The Director General

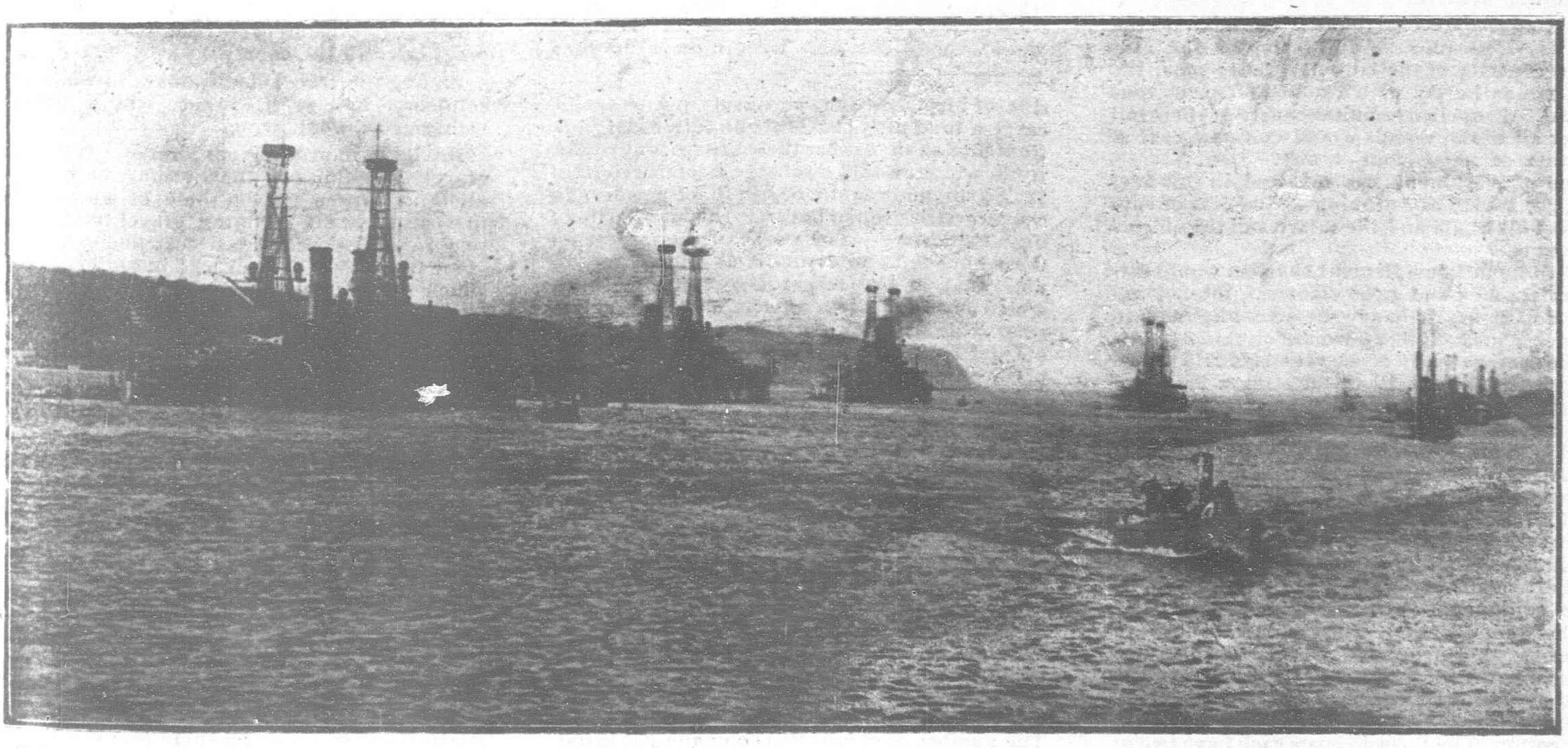
STEEL BRIDGE 80 M. SPAN OVER KLONG THA LAW AT KM. 262 OF THE NORTHLINE, ROYAL STATE RAILWAYS

THE ATLANTIC FLEET

SOME INTERESTING FIGURES CONCERNING THIS MIGHTY ARMADA

From every standard of comparison the most notable fleet ever assembled by the United States was that reviewed by President Taft and Secretary of the Navy Meyer, at New York, November 2. It involved the greatest number of American vessels ever mobilized, with the greatest total displacement and represented the maximum in fighting effectiveness probably ever gathered at one point by any nation.

As indicating something of the increased strength of our Navy it is interesting to contrast the number of vessels and their total displacements, which took part in the other important naval reviews of recent years. In the international naval review at New York in March 1893 there were 14 American naval vessels of all classes with an aggregate displacement of 39,436 tons. President Roosevelt, in September 1906, reviewed, at Oyster Bay, the Atlantic Fleet then comprising 45 vessels displacing 279,612 tons. During the Jamestown Exposition there was mobilized at Hampton Roads in June 1907 a fleet of 33 vessels displacing 285,251 tons. When the Atlantic and



Underwood and Underwood

THE U. S. ATLANTIC FLEET

Pacific fleets met at San Francisco in May 1908 they combined a total of 46 vessels displacing 407.924 tons and in September 1909 at the Hudson-Fulton celebration 43 vessels were assembled with a total displacement of 316.762 tons. This latest review at New York included 102 vessels of all classes displacing about 577,285 tons, which does not include the eight submarines of which no figures were available. Concurrently at Los Angeles a review was taking place of 24 vessels of 116,000 tons displacement giving a grand total of 126 vessels displacing 694,000 tons. Perhaps the most striking evidence of our progress is that of all the vessels in the New York review the only ones that were a part of our Navy at the time of the Spanish War were the battleships Iowa, Indiana and Massachusets, the gunboats Castine, Nashville, Marietta and Petrel, a few of the small torpedo boats and some of the fleet auxiliaries.

An Analysis of the Atlantic Fleet.—The following table shows the number of vessels of each class in the Atlantic fleet and their total displacement:—

	Tons.
24 battleships	366,864
2 armored cruisers	29,000
2 cruisers	6.950
22 destroyers	15,463
16 torpedo boats	2,994
8 submarines	....
3 tenders to torpedo fleet	8,466
4 gunboats	4.737
9 miscellaneous	40,733
8 colliers	93 938
1 oil tanker	6,159
3 tugs	1,981
102 vessels of all classes	577.285

Exclusive again of the submarines these vessels represent a total horsepower of 946;811, for the supplying of which there are 567 boilers with an aggregate of 46,360 sq. ft. of grate surface and 2,062,000 sq. ft. of heating surface. All of the battleships, cruisers and torpedo boats, except the battleship Iowa, have water tube boilers. This is an interesting reversal of the condition of affairs at the time of the Spanish-American war when outside of the torpedo boats there were only four warships then equipped with water tube boilers. Seventeen of the destroyers burn oil as fuel and the four latest battleships Delaware, North Dakota, Utah and Florida burn oil in conjunction with coal. The fleet has attached to it a fuel oil tank ship to carry the reserve fuel oil supply for these vessels, serving the corresponding function of the eight colliers carrying the coal supplies for the other vessels.

The aggregate coal bunker capacity of the fleet is 81,450 tons. Adding to this the coal cargo capacity of the colliers, 58.813 tons, the fleet can sail away with a total of 140,263 tons of coal. Propelled simultaneously at their full power all of the vessels would consume coal at the rate of 20,000 tons a day.

The Government has invested in this fleet $123.397.400 to say nothing of the cost of supplies of all kinds and the salaries of the officers and crew.

With its full complement the fleet would carry 27 344 men and 1,660 officers, a total of 29,004, and it is safe to say the actual figure is in the neighborhood of 25,000 men

The average speed of the vessels is 21 6 knots. The fastest vessel is the destroyer Paulding which iscapable of a speed of 32 8 knots. Placed end to end touching, the vessels of the fleet would extend a total length of 29 942 ft. or over 5⅔ miles. If passed in review in single file at an average distance apart of 300 yards the fleet would form a line extending nearly 23 miles and at an average speed of 10 knots an hour would take about 2 hours to pass a given point.

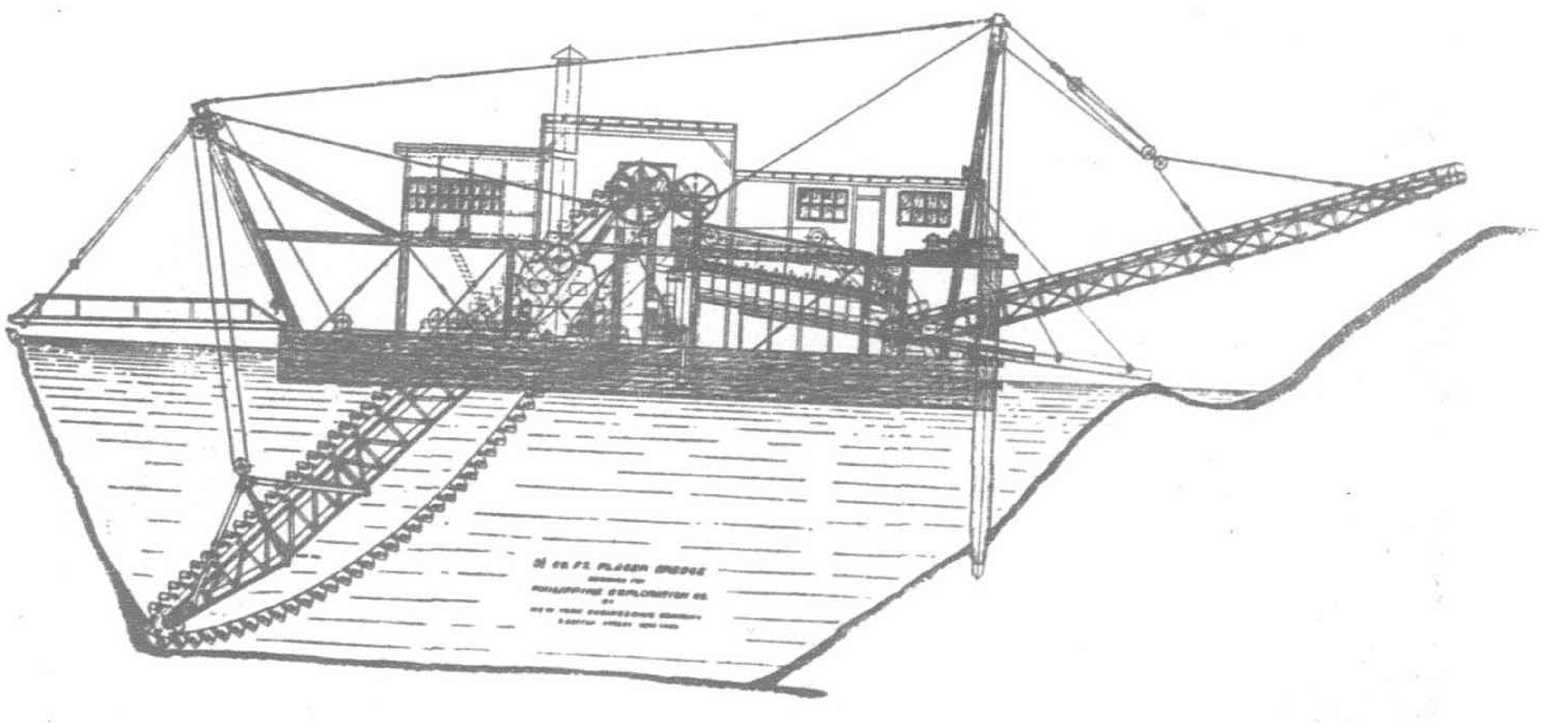
The armament of the fleet includes 181 torpedo tubes and 1590 guns of all kinds. The battleships, armored cruisers and scouts have either two or four submerged torpedo tubes discharging 21-in. torpedos and their battle equipment of four torpedos for each tube would make a total of 300 torpedos each carrying 200 lb. of gun cotton. The torpedo boats each have two or three 18-in. tubes and in time of war would carry all told about 200 torpedos. A single broadside of torpedos from the vessels in line would carry a total of 35,000 lb. of gun cotton. Of guns from 6 to 13 in. caliber there are 496, one round from which would discharge a total weight of 182,800 lb. and require 62,650 lb. of powder. In the projectiles would be carried about 7000 lb. of high explosives. The range of the largest of these guns is 12 miles and it is interesting to note that at the recent target practice from which many of these vessels have just come, remarkable accuracy of fire was shown at ranges of from 15,000 to 16 000 yards. The remainder of the guns in the fleet, ranging in caliber from 1 to 5 in., discharge projectiles ranging in weight from 1 to 60 lb.

It is self evident what such a fleet as this means to the shipbuilding and ordnance manufacturing industries, but there are also less intimately associated industries that played an important part in the equipment of this fleet. We are advised for example by the Blake & Knowles Steam Pump Works, 115 Broadway, New York City, that it has installed pumping equipment on 65 of these vessels which is a large percentage considering that nine of the remainder carry no steam pumps, including the submarine, and one sailing vessel, and that eight of the others, principally colliers, were built abroad. The number of pumps this company has installed on the fleet exceeds 1000 and their cost represents nearly a million and a quarter dollars.

DREDGES AND GOLD DREDGING

We are in receipt of a highly illustrated brochure published by the New York Engineering Company of New York City, devoted to a review of the history of Empire Gold Dreging machinery and the activity of the company as designers and builders of the modern gold dredge covering orders for construction and installation from almost every section of the globe.

The company provides every facility for the ground owner to secure the very best machinery and service adapted to local conditions. It not only manufactures dredges but serves as dredge engineer, designer, and builder. This will be recognized as a marked advantage over companies confining their operations to manufacturing only as it is as important that a dredge be correctly designed to fit the particular conditions under which it must operate as to have it well built. The company specializes in these particular departments with greater economy to the purchaser than if the different offices of engineer, designer, and builder were placed in as many different hands. Besides, the New York Engineering Company devotes its entire attention to gold dredging machinery so that the greatest possible efficiency may be expected.



ELEVATION OF EMPIRE STEAM DRIVEN DREDGE WITH WOOD HULL AND FRAMING BEING BUILT FOR THE PHILIPPINES EXPLORATION CO.

The dredges of the company are operating in different parts of the United States, Colombia, Brazil, British, Dutch, and French Guiana, Venezuela, Tierra del Fuego, and Siberia which gives a wide experience in the many varied conditions met with in these different countries. An order was recently placed by the Philippines Exploration Company for the construction of a specially designed Empire steam driven, five and one-half foot bucket placer dredge for the Guamas property in Paracale. This order is now being executed and was designed to meet the peculiar conditions in Paracale and the character of the Guamas ground. Two features of the dredge are its large gold saving surface and the ample deck room provided.

The location of this company in the center of production in the United States gives it an advantage in securing prices and quality of steel and in desirable position to cope with its growing export trade. It constructs and instals dredges driven by steam, electric, gasoline, and indeed for any motive power. It has introduced steel hull construction with great success especially in countries having extremes of temperature.

Avoiding the misleading practice of constructing a stock dredge the New York Company designs each dredge, to suit conditions under which it is expected to operate instead of trying to make one standard of equipment fit all situations.

The wide experience of the company evolved a most satisfactory solution in the working of ground having a large percentage of clay. The device is an improved clay washing machine which will disintegrate the clay and save practically all the values.

Among the varied conditions with which the company has wrestled successfully may be mentioned the following.

Dredging in arid regions; dredging cemented gravel so indurated that it must be blasted; dredging frozen gravel, some of which must first be thawed; dredging gravel lying on a tough, blocky, schist bedrock, and to a depth of six feet into the bedrock; dredging gravel which contains occasional boulders weighing two tons, and having overburden over thirty feet deep or sometimes containing tenacious clay and buried timbers. These are a few instances of what may be accomplished where intelligent investigation and appropriately designed and well constructed machinery have combined to bring about great success.

A record in dredge building to the credit of this company was the designing and construction of an electrically driven gold dredge complete with steel hull together with a 500 h. p. steam-electric generating plant, complete machine shop equipment, and wood sawing and splitting plant for cutting the fuel; two wood conveyors each 700 feet long, traction engines and all the supplies for the erection of the entire plant and buildings in Siberia for the Orsk Goldfiels Ltd. of London The plant weighed in all over 2,000 tons and cost $250,000 The contract called for shipment in four months fifteen days and the shipment was made in four months and ten days.

THE WILLIAM CRAMP & SONS SHIP AND ENGINE BUILDING CO.

The shipyards of the William Cramp & Sons Ship and Engine Building Co. of Philadelphia of today, one of the leading establishments of its kind in the world, is the outgrowth of a shipyard established by William Cramp in 1830. Originally located at the foot of Otis Street (now East Susquehanna Avenue), and later at the foot of Palmer Street (the present site of the Company's dry dock, marine railways and repair shops), the plant of the early days bore little resemblance to that of to-day. But even then, as now, its ships represented the latest and most perfect examples of shipbuilding. In 1872 the business had outgrown the Palmer Street yard and about one-third of the water front of the present establishment was purchased. In March of that year the Company as it now exists was incorporated under its present name "The William Cramp & Sons Ship & Engine Building Company."

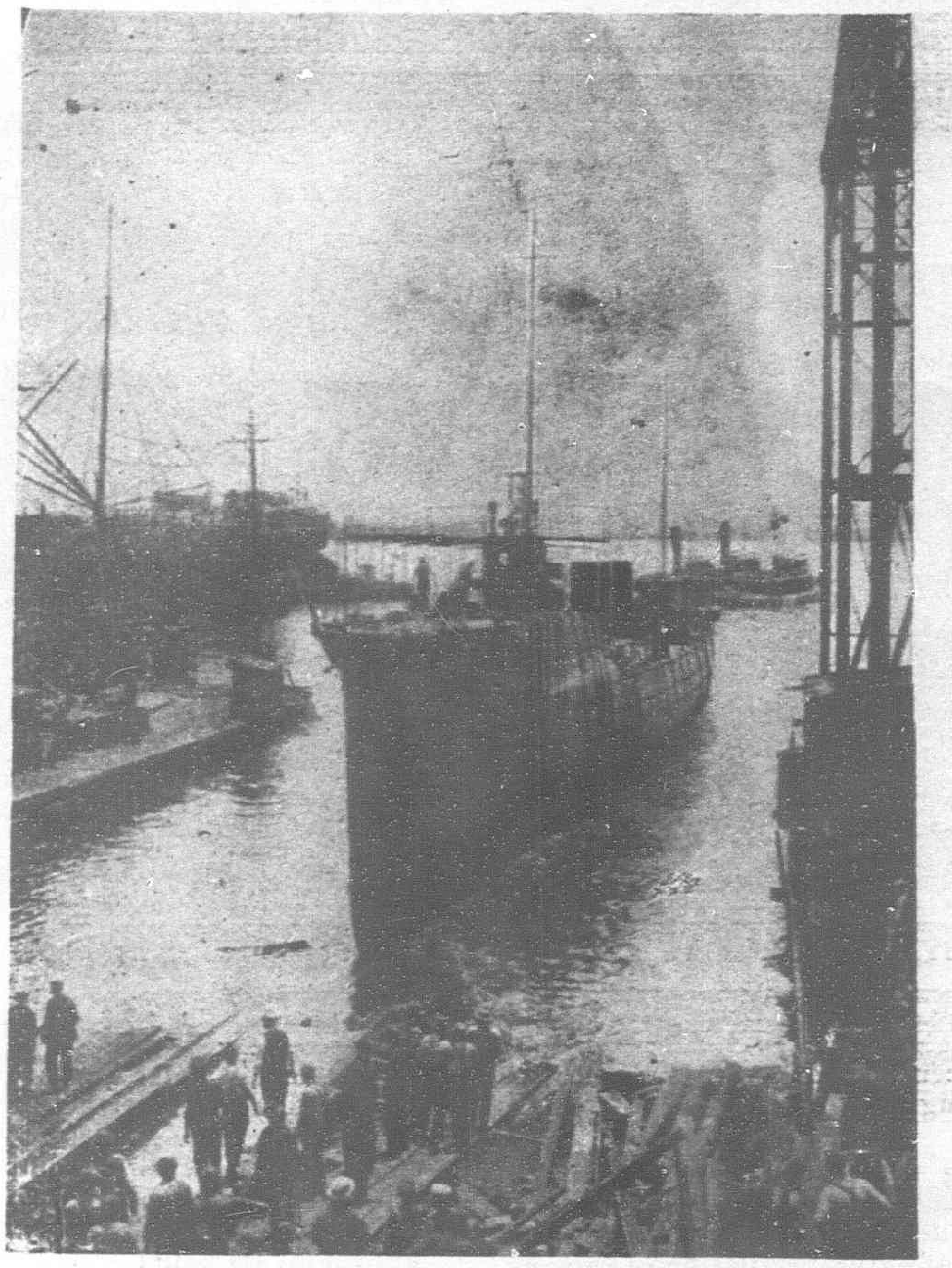
William Cramp died in 1879 and Charles H. Cramp, his eldest son, succeeded to the presidency. For twenty-four years he was the active head of the business. Under his management, in 1891, the Cramp Company obtained control of the I. P. Morris Company, and in 1899–1900 large additions were made to the plant, comprising additional building slips and water front, a large new machine shop and a new power plant. In 1903 Henry S. Grove succeeded to the presidency, and under his management the Company's progress and development has gone uninterruptedly forward.

The record of the thirty-seven years since the Company's incorporation shows an increase in actual value of ground and equipment from about $500,000 to about $12,800,000, representing a normal and healthy progress and development in the effort to keep fully up with the best requirements of the shipbuilding business.

The total number of vessels of all descriptions built or building since 1830 is 366; and the total number of marine engines is 290. Thirty-six of the vessels have been for the United States Navy; one first-class battleship, one protected cruiser, three corvettes, and one unprotected cruiser for the Imperial Russian Navy; one protected cruiser for the Imperial Japanese Navy; one for the Imperial Ottoman Navy; and a gunboat for the Venezuelan Navy. Over one hundred of the steamers included in the above number range between 1000 and 12.500 tons register, while the balance of the list is made up of steam boats, tugs and yachts, with twenty-eight first-class sailing vessels and one hundred craft for various special uses. This Yard has constructed eight trans-atlantic liners, the only ones ever built in the United States.

Not long after the Civil War it was found necessary to add to the shipyard a plant for the building of propelling machinery. At the present time the Company is equipped with one of the best machine shops and boiler shops for turning out marine work, and has built engines to propel every type of craft from small tug boats and yachts of 500 horse power to the monster battleships and armored cruisers of 30,000 horse power. In the last three years a number of Parsons' turbine propelling engines have been built at this yard. Cramp-Zoelly marine turbines for two torpedo boat destroyers for the United States Navy are now in course of construction.

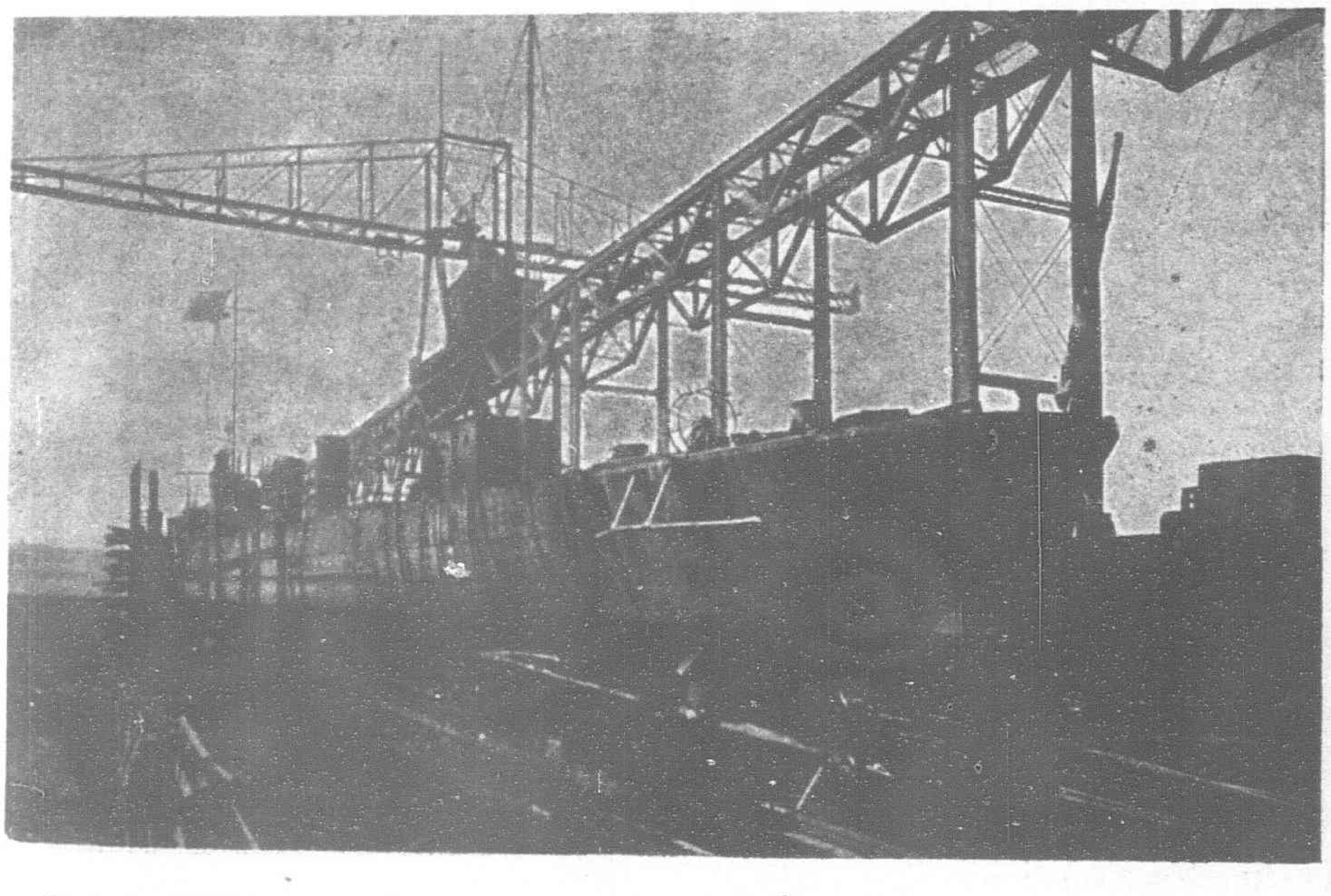
It is the earnest endeavor of the present management to keep the plant in all respects abreast of the times and to maintain a staff well equipped to handle every problem that may arise in modern shipbuilding. How well this is being accomplished, the results illustrated in the following pages may be permitted to speak for themselves.



U. S. S. ROSWELL H. LAMSON, TORPEDO BOAT DESTROYER, CONTRACT SPEED 28 KNOTS, BUILT BY CRAMP

The latest U. S. Battleship now in commission built at the Cramp's Shipyard was the South Carolina. This vessel is a first class battleship of 16,000 tons displacement and was authorized by act of Congress, March 3, 1905. The contract was awarded on July 21, 1906, the first plate laid, December 18, 1906; and the hull launched, July 11, 1908. The vessel was delivered to the Government, November 15, 1909, or about three years and three months after the signing of the contract. The price for construction of hull and machinery was $3,540,000, of which sum $2,615,000 was alloted to the hull and $925,000 for the propelling and auxiliary machinery. The length between perpendiculars was 450 feet, over all 452 feet 9 in. and on straight keel, 384 feet 6 in. The breadth, extreme, at L W. L outside of armor, 80 feet 2.3/8 inches; molded, 79 feet 10 /8 inches. The depth molded main deck at side, is M. S. 34 feet 6 3/8 inches, upper deck, at side, M. S. 42 feet 10.7/16 inches. The two main engines are of the vertical, direct acting, four cylinder, triple expansion type, designed to develop about 16,500 i. h. p. at about 125 r. p. m. with a steam pressure of 265 pounds at the H P. cylinder. Twelve Babcock & Wilcox boilers fitted with superheaters are installed placed four each in three watertight compartments, symmetrically arranged.

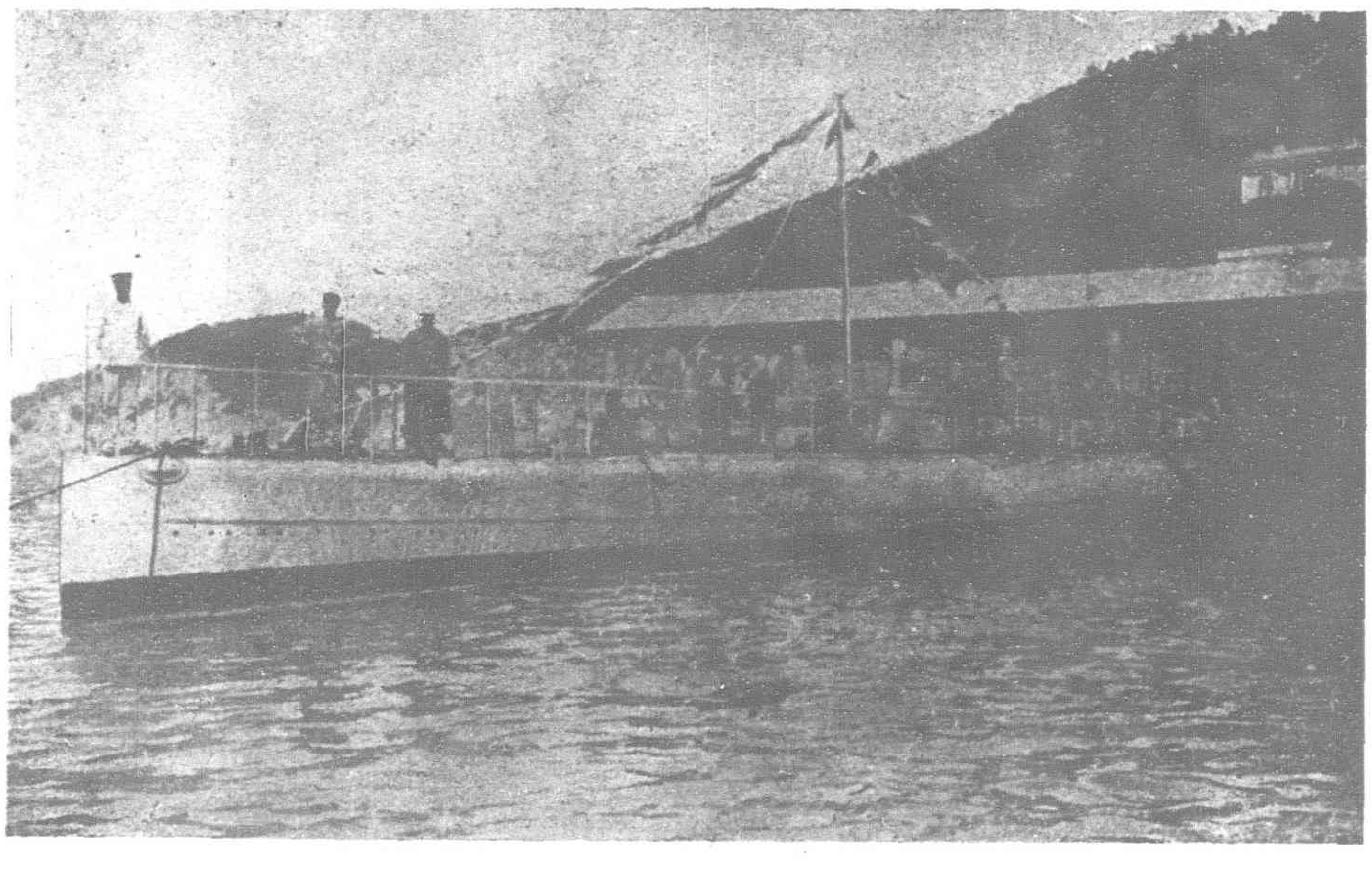
The contract required an average speed of not less than 18.5 knots in the open sea for four consecutive hours at a mean draft of 24 feet, 6 inches, corresponding to a displacement of 16,000 tons, and the twenty-four hour endurance and coal consumption trials under the same con-



U. S. S. JOSEPH B. SMITH, TORPEDO BOAT DESTROYER—SPEED 31 KNOTS—BUILT AT CRAMP'S SHIPYARD.

ditions at 17.5 knots and 12 knots speed. At the speed trials the South Carolina made 19.25 knots. Her main battery comprises 8 12-in. B. L. R. The South Carolina was among the first vessels upon which the lattuce mast was installed.

At the Shipyard during 1909, the following men of war were building for the United States government. The torpedo boat destroyers Joseph B. Smith, Roswell H. Lamson, Lewis Warrington, and the John Mayrant, the two first having a displacement of 700 tons and the last 742 tons; the submarine torpedo boat Thrasher; the Collier Cyclops of 19.200 tons displacement, No. 36 torpedo boat destroyer 742 tons displacement, and the superdreadnaught Wyoming the largest type under construction.



ITALIAN IMPERIAL NAVY SUBMARINE FOCA, BUILT BY CRAMP.

The Wyoming is a first class battleship of 26,000 tons displacement; length 554 feet, breadth, 93 feet, depth, 28.1/2; i. h. p. 30,000. The contract requires the installation of Parsons Turbines and that she develop a speed of 20.1/2 knots endurance. When put in commission she with her sister ship the Arkansas will be the largest vessel in the American Navy. Her main battery will comprise 12 12-inch guns and 27 small guns.

The Iron Works of the I. P. Morris Company controlled by the Camps Company is one of the oldest machinery building organizations in the United States. Its business was instituted in 1828 at the corner of Market Street and Schuylkill 7th, now Sixteenth Street, under the firm name of Levi Morris & Company. In 1841, the name was changed to the I. P. Morris Company, and in 1847 the present site for the works was purchased, the Company being known as the Port Richmond Iron Works. Late in 1875 the Company was incorporated.

In 1891 the control passed to the William Cramp & Sons Ship & Engine Building Company and on July 1st of that year Mr. John T. Morris was succeeded in the presidency by Mr. Charles H. Cramp, who was succeeded in turn by Mr. Henry S. Grove in 1903.

From the organization of the Company the principal line of work has been the production of heavy castings and machinery of a miscellaneous character requiring special designs and the highest class of engineering for its satisfactory performance. For greater convenience in handling this varied business the company has been divided into two departments—the Mechanical Engineering Department and the Hydraulic Department.

Mechanical Engineering Department.—Up to the time of the Civil War the principal work of the company was the construction of steam engines and sugar mill machinery. From 1861 to 1869 it built the main propelling engines, together with a number of their auxiliaries, for the gunboats Itasca and Soloto, the monitors Langamon and Lehigh, the first Monadnock and Agamenticus, the sloop-of-war Pushmatah, and the steamer Tacony—all for the U. S. Navy. Some of these engines were very large for their day, particularly those for the Pushmatah, which were 60 inch cylinders by 36-inch stroke.

In 1894 a Leavitt compound vertical inverted beam flywheel pumping engine was built for the Water Company of Louisville, Ky., and in 1902 a triple expansion beam, flywheel engine from the same designer, operating two single acting pumps, was built for the City of Boston Sewage Plant. These pumps held the world's record for several years as the most economical steam engines, with a coal consumption of only about one and one-tenth pounds per horse powerhour.

The I. P. Morris Company is particularly well known for its boiler work. Among the large number built may be mentioned the boilers for the Boston Sewage and Pumping Station Power Plant, the boilers for the Bureau of Filtration, Lardner's Point Pumping Station, and Belmont Filter Plant, Philadelphia; special boiler economizers for the United Gas Improvement Company, installed at Philadelphia and at Waterbury, Conn.; and the marine type of boilers built for the Southern Pacific Steamships Momus and Antilles. These last were the heaviest marine boilers ever built in the United States. In addition to these a great many sets of special evaporating apparatus have been manufactured. These are built of copper, plate steel or cast iron, with diameters of more than nine feet and lenghts of more than fifteen feet.

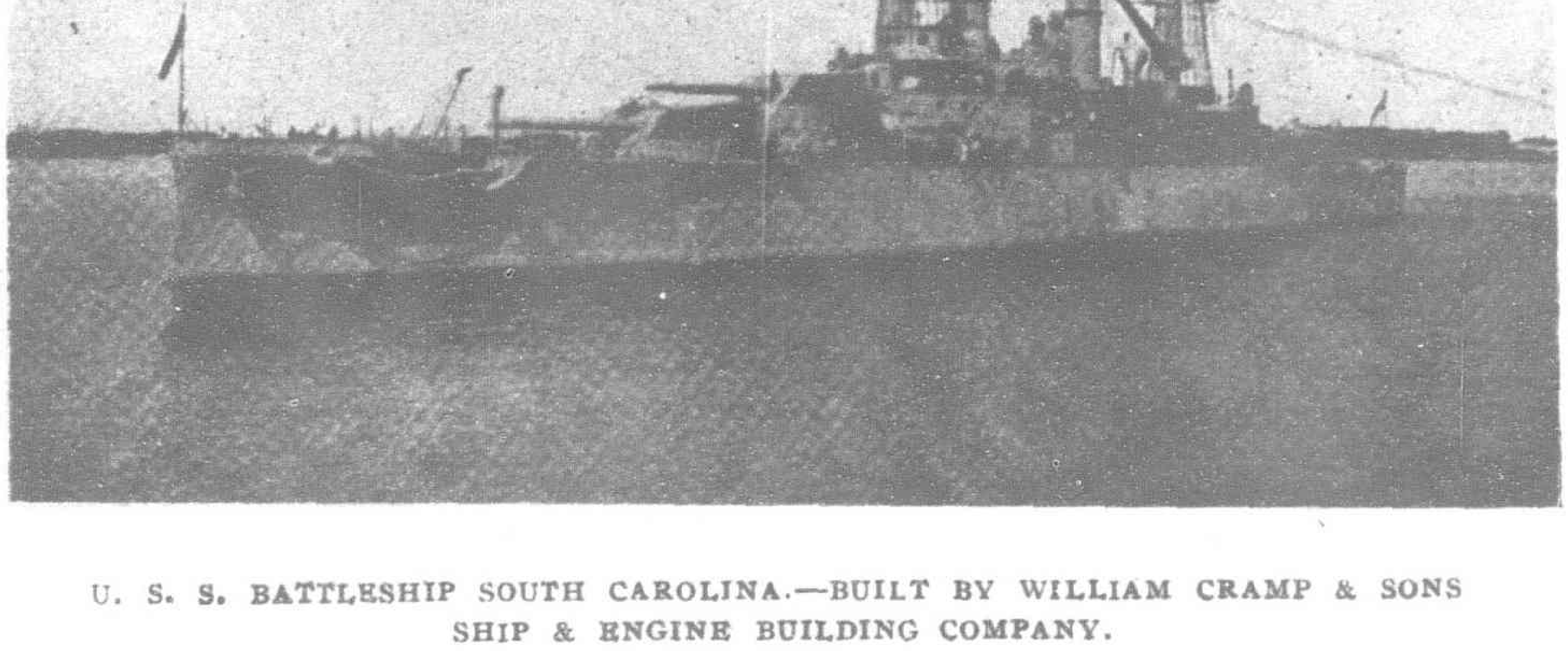
For the Kirschner Rotary Oil Press Company a special rotary hydraulic oil press was constructed, operating under a pressure of about 4,000 pounds per square inch.

This Company built the first Parsons Marine steam turbines installed by the William Cramp & Sons Ship & Engine Building Company, consisting of two low pressure and astern turbines for the steamer Old Colony. These, combined with the high pressure turbine, gave a horse-power of about 10,000.

Hydraulic Department.—The first hydraulic turbine work undertaken by the company was the construction of seven turbines of the Geyelin type, for the Fairmount Waterworks of the city of Philadelphia. The first unit was installed in 1851 and was among the earliest turbines built in the United States. These turbines were operated continuously until 1908, when the new filtration station was completed. The Geyelin turbines, however, are at the present time ready for use should occasion arise.

The building of the turbines for the first installation of the Niagara Falls Power Company was entrusted to the I. P. Morris Company by a Commission of International Engineers, organized for the purpose of considering designs of machinery for utilizing the power of Niagara Falls. This work was so satisfactory that the company was awarded the contract for the units in the station known as Wheelpit No. 2 of the Niagara Falls Power Company, and was awarded the contract for two wheels in the plant of the Canadian Niagara Power Company.

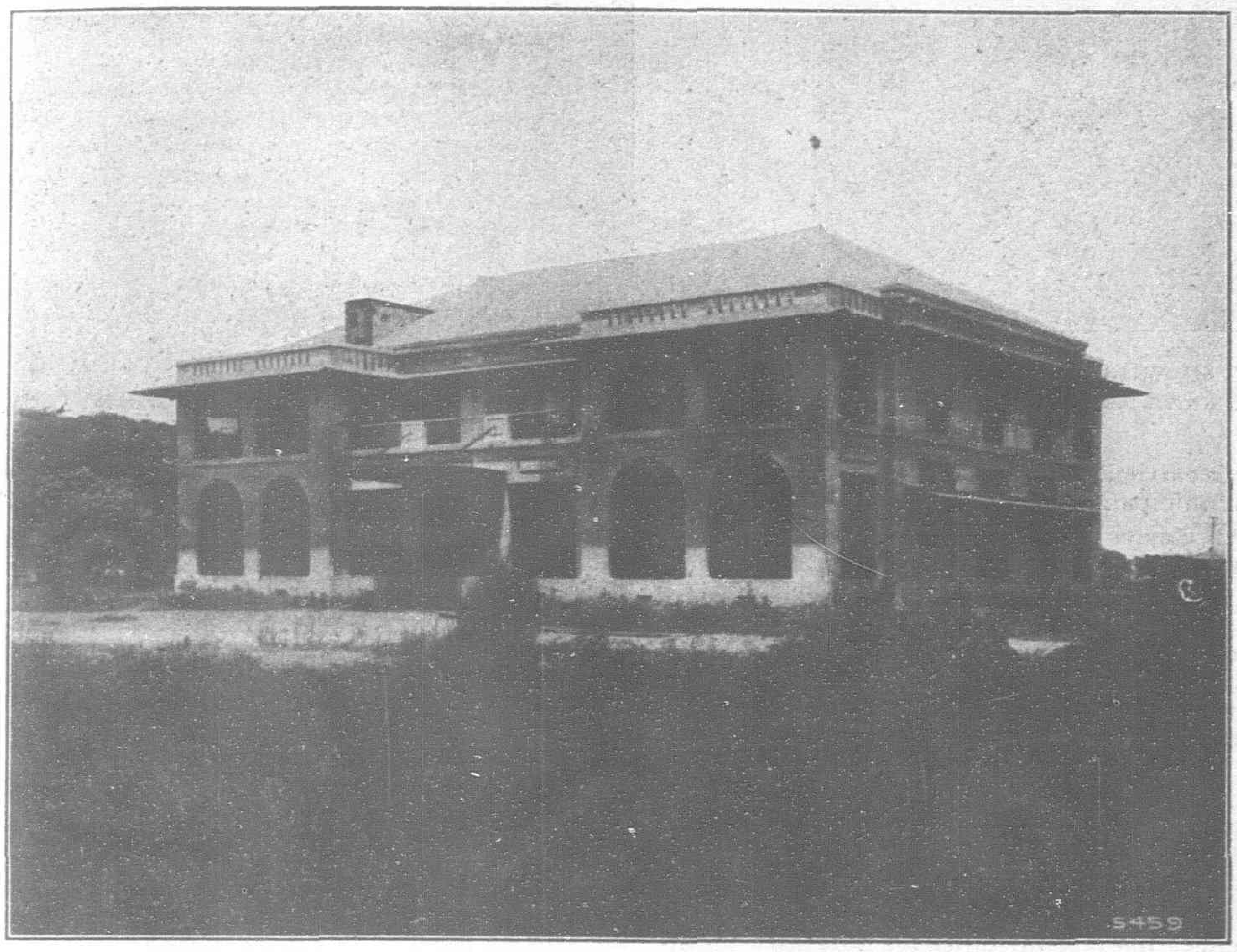
When recent tests were made on the 10,000 horse-power turbine wheels for the Niagara Falls Hydraulic Power & Manufacturing Company, and the 750 horse-power wheels for the Porto Rico Railway & Light Company, it was shown that the I. P. Morris Company has secured the highest efficiencies ever obtained with turbines in commercial service. Both tests show the efficiencies to be well above 90 per cent.



U. S. S. BATTLESHIP SOUTH CAROLINA.—BUILT BY WILLIAM CRAMP & SONS SHIP & ENGINE BUILDING COMPANY.

PHILIPPINE PUBLIC WORKS

An interesting review of the activities of the Bureau of Public Works of the Philippine Islands is contained in the annual report of the Hon. Charles B. Elliott, Secretary of Commerce and Police, just received from the press. The report is illuminated by a large number of comprehensive statistical charts that give in detailed and adaptable form an epitome of the results obtained in the different divisions of activity in the Bureau. The following excerpts are of interest:



NURSES' HOME AT THE PHILIPPINE GENERAL HOSPITAL

(a) Personnel.—Mr. Clarence W. Hubbell was Acting Director of Public Works from the beginning of the fiscal year until October 17, 1910, on which date Mr. Warwick Greene, the Director, returned from a leave of absence in the United States, and resumed his duties.

The engineer corps averaged 110 engineers of all classes, with an average length of service of two years and fifteen days, and an average annual salary of a little less than ₱4.000.

On June 30, 1911, the total number of employees of the Bureau was 1,489, an increase of 27 per cent over the previous year. Of this number 563 were Americans and 926 Filipinos, an increase of 107 American and 211 Filipino employees.

(b) General.—The large increase in the amount of work handled by the Bureau, with the attendant increase in force, has made necessary the organization of a highly perfected machine, each unit with its work specialized, and the whole working harmoniously, with as much speed as is consistent with accuracy and economy. Great progress has been made during the year in developing the Bureau into an effective unit for the prompt completion of public works.

Economy has been brought about to a greater degree, I believe, than heretofore, through insistently directing the attention of engineers to engineering cost investigations, and valuation of completed work. Such investigations have been regularly made for the greater part of the organization units, including administration, engineering and superintendence, and supervision percentages.

The distribution of the total expenditure supervised by the Bureau, ₱9.822.648.56, is shown. These expenditures include all general office and maintenance of equipment expenses, the increase in investment of Bureau funds and special Insular appropriation in equipment, supplies and material, the expenses of provincial engineering offices, and the expenditure on the work itself, regardless of whether the funds were insular, provincial, or municipal. Of the total expenditure, ₱3,160,000, or 32 per cent, was paid directly to local labor or to local owners of carts and teams through the usual official means, on payroll or by voucher, and through contractors.

The construction organization handled 1,871,137 cubic meters of earth, sand, gravel, and stone. It used in the work 59,389.2 lineal meters of piling, 1,555.42 thousand feet board measure of form lumber, 2,543.5 thousand feet board measure of all other timbers and lumber, 1,540,376 kilos of reinforcing steel, 146,188 kilos of structural steel, and 39,551 cubic meters of concrete. involving the consumption of 73,117 barrels of cement.

There has been an increase in the amount of construction and maintenance carried on in every class of work except the construction of bridges and culverts. The expenditure for this class of work decreased 40 per cent below that of the previous year, with a corresponding reduction of about 33⅓ per cent in the number of lineal meters constructed.

(c) Provincial division.—Fifty-three per cent of the engineering corps of the Bureau was allotted to the provincial division during the fiscal year. This division is responsible for all road, bridge, and culvert construction and maintenance in the 31 Christian provinces, and for all building and miscellaneous public works in the same territory not handled by special organization.

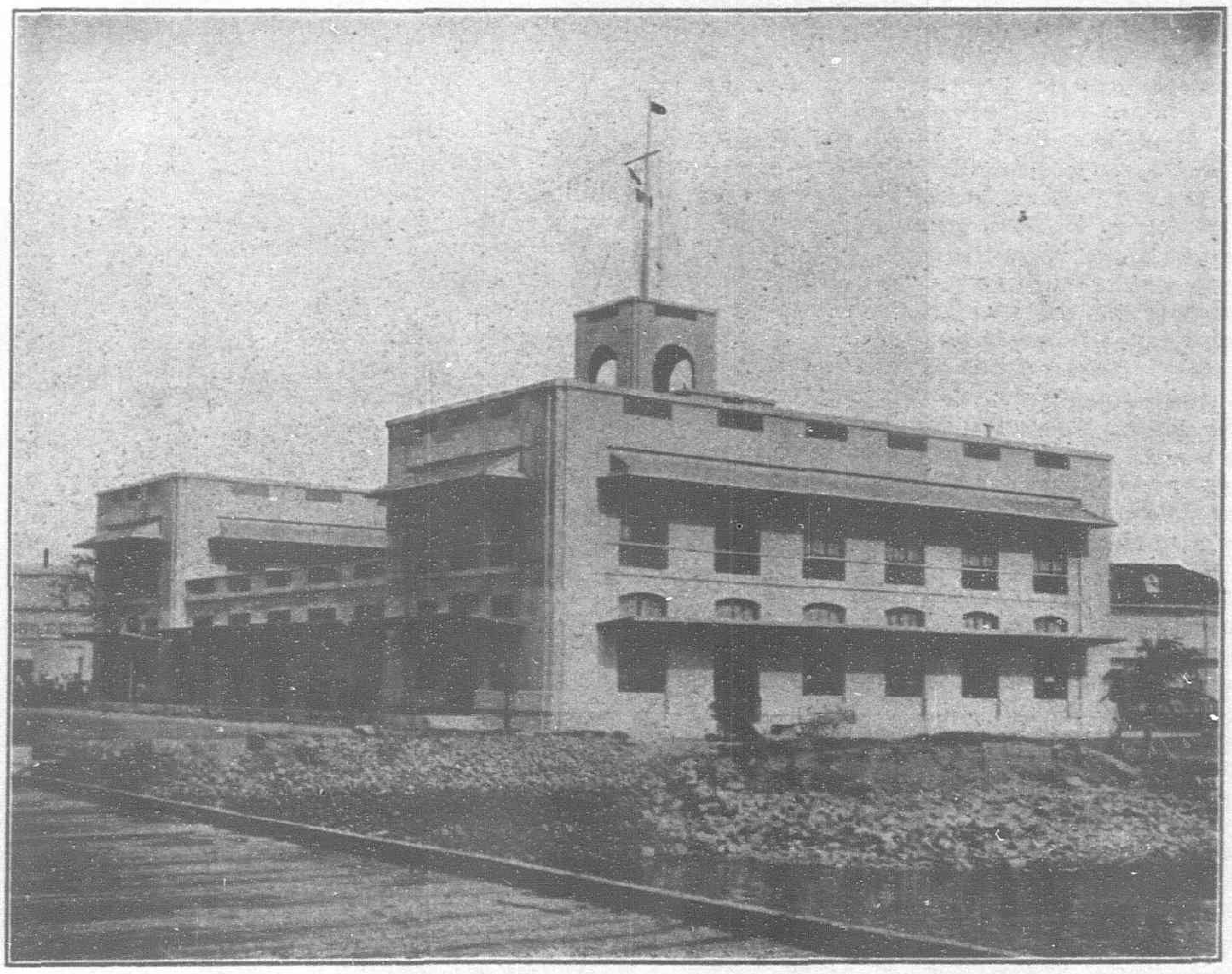
The former districts supervised by district engineers sometimes comprised as many as three provinces. Each province is now a separate district, with the exception of Samar, which has been combined with the Province of Leyte.

It is the uniform policy of the Bureau to properly maintain existing roads and structures in good condition before undertaking any new projects, and the provinces have recognized their liability for the maintenance of completed roads and structures by making it a first charge on their available funds.

Three hundred and fifty-seven and thirty-nine hundredths kilometers of first class road were constructed, an increase of 40 per cent over the amount completed during the previous year.

Of the active road projects, the most important are those designed to run north and south from Manila to the extreme ends of the Island of Luzon.

But little difficulty has been experienced in recovering the necessary area for right of way, and all surveys of private property abutting upon public roads reserve a width of 15 meters for right-of-way purposes. The amount of first-class roads constructed having a durable and continuous surfacing increased to 1,587.6 kilometers.



NEW CUSTOM-HOUSE ON WATER FRONT AT CEBU, P. I.

The caminero and gang system of maintenance has been continued on all completed roads. All roads and road structures have been regularly inspected by both the force stationed in the provinces and the division

MAINTENANCE ON A FIRST-CLASS HIGHWAY, SHOWING GRAVEL RECEPTACLE
The arch is on the boundary line between the Provinces of Rizal and Bulacan

engineers, and an independent check has been maintained on the condition of highways and structures by regular reports from division superintendents of schools and senior inspectors of Constabulary.

(d) Building work.—Insular building funds become available by special appropriation, by appropriation of the bureau concerned in the work, and by due authorization for expenditure of Bureau of Public Works funds. They are expended under the supervision of the Bureau of Public Works for the construction, alteration and maintenance of insular buildings in the Christian provinces and Baguio, except in the case of some barrio schools. The cost of maintenance of insular buildings is always a charge to the Bureau concerned. Provincial building funds are obtained by appropriation of provincial boards, and in the Christian provinces, in all cases where the estimated cost of work exceeds ₱500, are expended under the supervision of the Bureau of Public Works. Municipal building funds, and the supervision of the work carried on therewith, are at the disposition of municipalities.

CONSTRUCTION OF MAIN IRRIGATION CANAL AT SAN MIGUEL, TARLAC

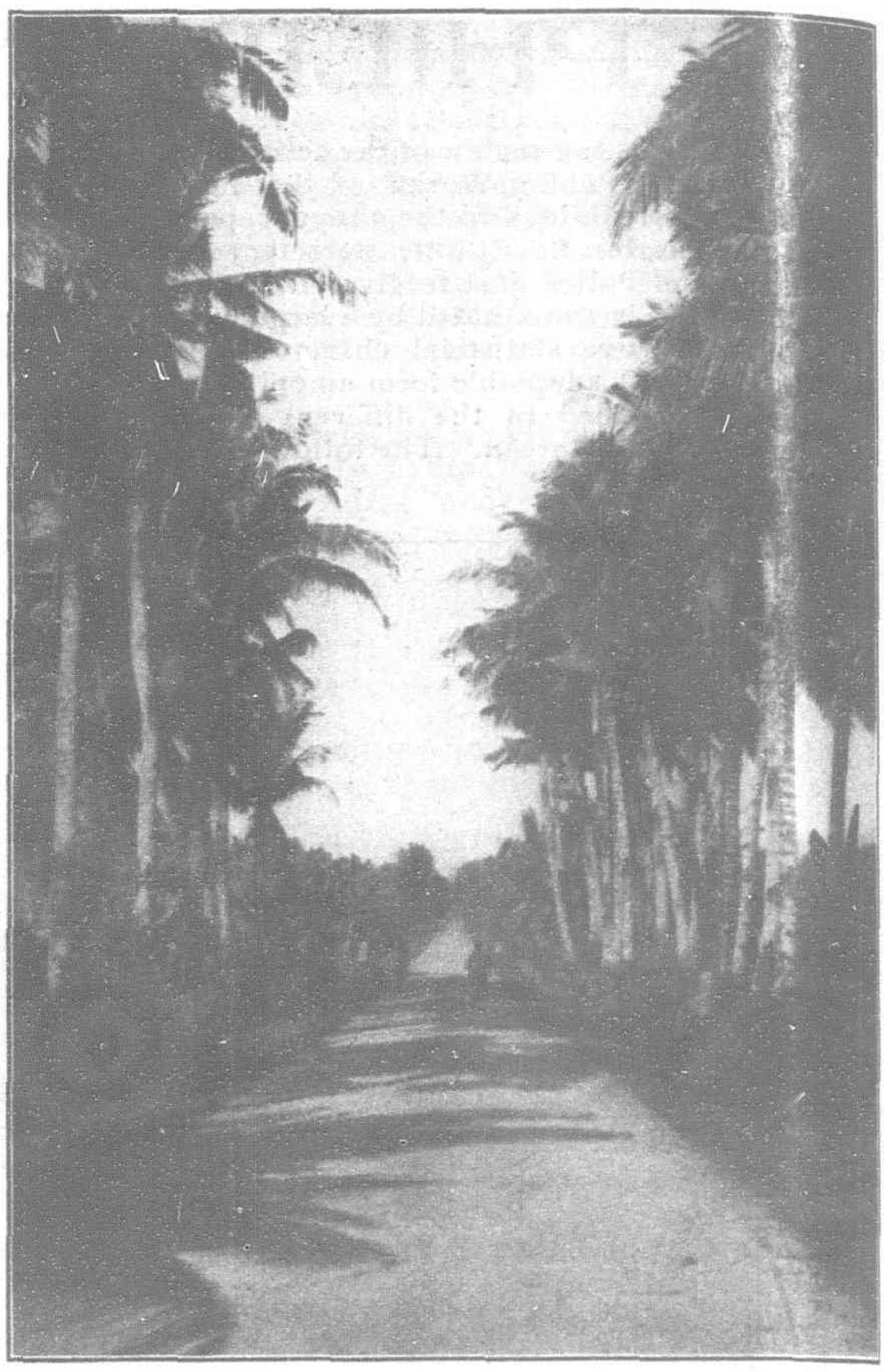
All classes of building work are carried on by four divisions in the Bureau of Public Works.

(1) The Consulting Architect, whose entire working force is assigned to him by the Director of Public Works, prepares all plans and estimates for building work, and in special instances supervises the construction of important buildings.

(2) The provincial division, through its district engineers, supervises provincial building construction, alteration and repair.

(3) The division of building maintenance, alteration and repair supervises, in Manila only, work of the character indicated by its title, and assumes the responsibility for necessary building custody at the same place. This division also does the cement testing for the Bureau.

(4) The Baguio office, in conjunction with the city engineer, Baguio, supervises insular and municipal building work at that place.

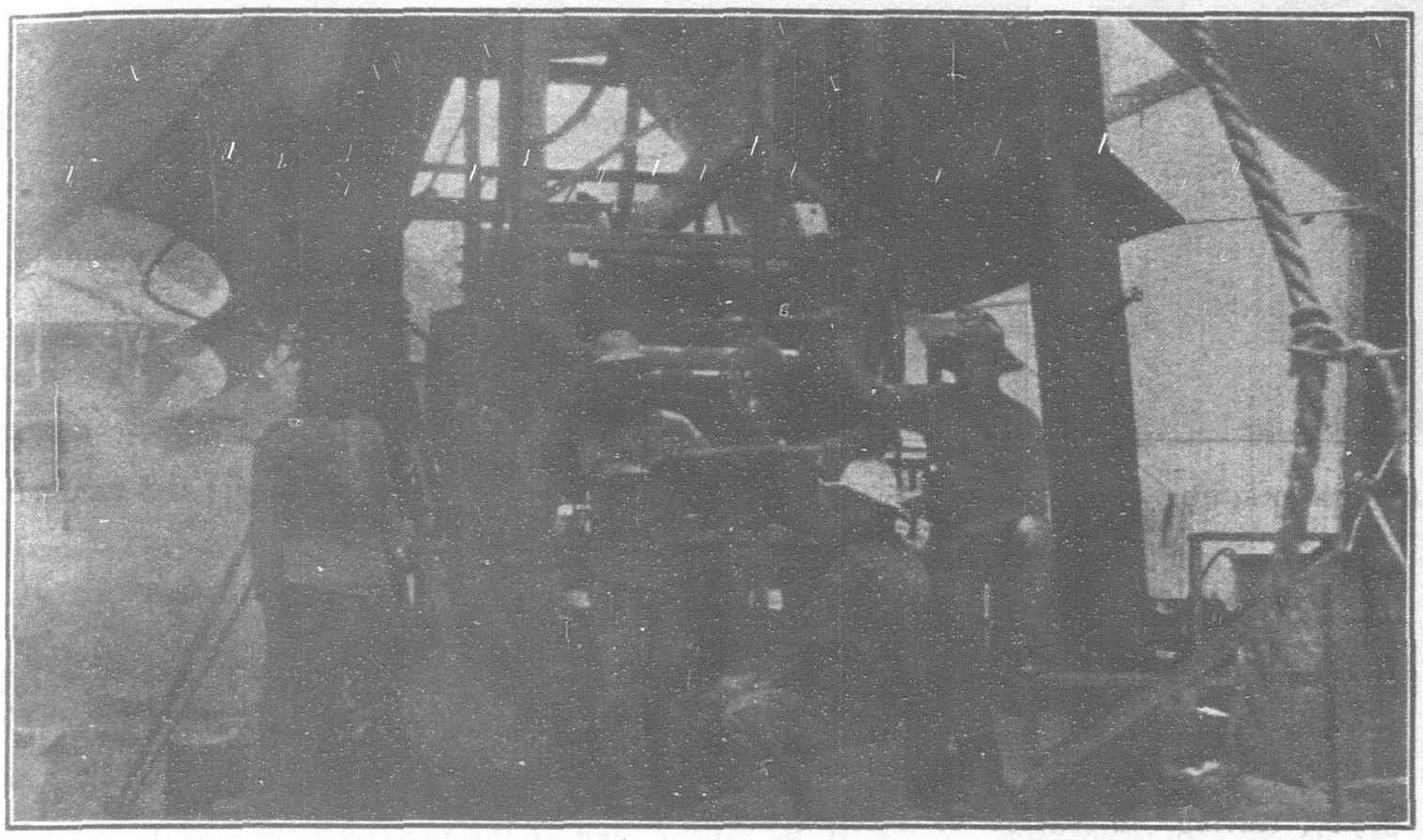


A FIRST-CLASS ROAD IN CEBU PROVINCE

(e) Irrigation division.—This division has charge of hydrographic and general irrigation investigation, design and construction, and river control project. The equivalent of 35 engineers handled this work during the year, an increase of about 20 per cent over the allotment of engineering force for the previous year.

Extensive cadastral surveys by the surveyors of the Bureau of Lands, covering irrigable areas recommended for construction projects, were financed by the Bureau of Public Works under an arrangement whereby the Bureau will be reimbursed for its outlay.

Forty-nine new projects were commenced. Progress was made in the standardization of irrigation design. The largest irrigation project ever attempted in the Philippine Islands is under construction at San Miguel, Tarlac. It is designed to irrigate 4,000 hectares of land, and is about 90 per cent completed. Unfortunately, since the end of the fiscal year it has been seriously damaged by one of the worst storms ever known in the country.



KEYSTONE DRILLER NO. 5 OPERATING IN THE ARTESIAN WELL DIVISION OF THE BUREAU OF PUBLIC WORKS

Fifty thousand pesos was expended in connection with irrigation systems on friar lands estates, a complete topographical survey was made on one of the Cavite estates, and a second is nearly completed.

At Batangas, projecting works for 350 lineal meters of river bank were constructed, to shield the town from damage by the Calumpang River. This was the most important item of river control undertaken during the year, and cost ₱17,101.

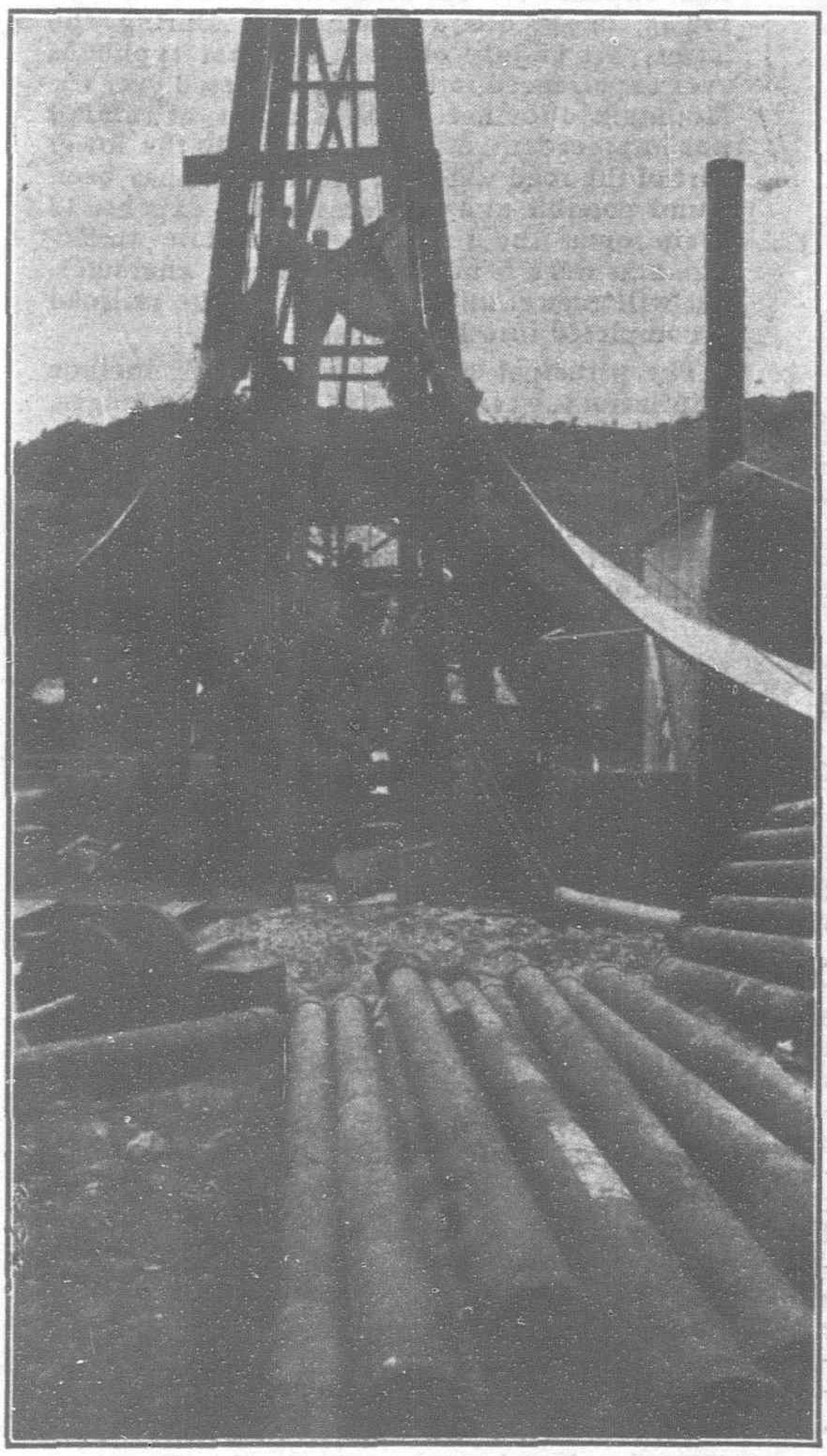
(f) Artesian well division.—This division conducts well-driving operations for the purpose of securing potable water where the present supply is unsatisfactory, and superintends the construction of water systems where the water supply is available by other means. On June 30, 1911, the Bureau owned 11 deep-well rigs and 43 jet rigs, an increase of 5 deep-well and 20 jet rigs over the number at the beginning of the year. The drilling capacity increased 60 per cent, or from 7,400 meters during the fiscal year 1910, to 11,850 meters during the fiscal year 1911. Provinces owned and operated 12 jet rigs at the end of the year, an increase of 7 rigs, and 1,050 meters of wells, or 140 per cent in capacity.

(g) Statistical division.—There has been an improvement in the reliability of engineers' preliminary estimates of cost upon which appropriations are based, brought about in part through the careful determination of typical unit costs on actual work. The work of the statistical division of any large organization is necessarily exacting, and under the unusual conditions which American engineers must contend with in the Philippine Islands, compiling reliable bases on which to work out costs in different sections of the Archipelago has been found to be slow work.

In addition to the statistical work connected with engineering problems, extensive investigations of the condition of machinery, as to depreciation, interest on investment, and rental, have been commenced. Pending the completion of such investigations an arbitrary percentage is written off for depreciation.

Building work has been reduced to its units, and corresponding statistics obtained.

(h) Physical valuation of completed engineering work and of engineering equipment.—The most severe criterion of the economy of an engineering organization and of the durability of its work is the valuation of construction at stated periods after completion. If this valuation is based upon the known cost to replace a unit such as a cubic meter of concrete, and upon the known number of units placed, and comparison is then made directly with the amount of funds expended to produce the completed work, the data becomes of semi-permanent value. In the knowledge that such valuation follows the work, and that it is made by another engineer, the constructing engineer has an additional incentive to produce the best results with the smallest possible expenditure. Such a method of valuation has for the last three years been applied by division engineers to first-class road work, and to steel and concrete bridge and culvert work.



KEYSTONE DRILLER NO. 5 BORING AN ARTESIAN WELL IN CEBU

The status of machinery valuation is shown in Chart 35.

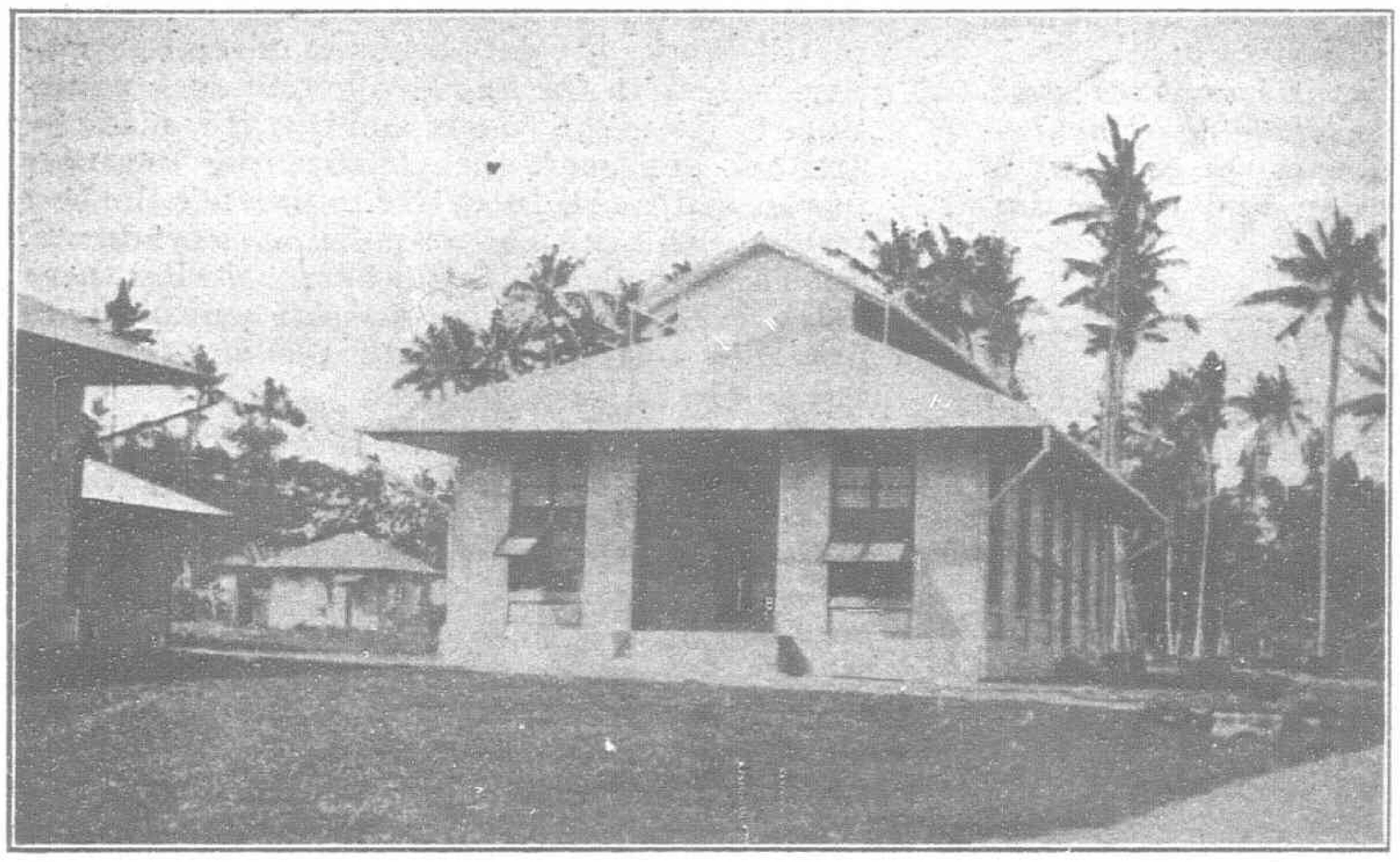
(i) Division of engineering design. This division prepares designs for engineering structures other than those of irrigation, hydro-electric, and mechanical construction and building work. It provides the necessary specifications and inspects fabricated steel. The miscellaneous drafting, blueprinting, and photographic work of the Bureau are centered here. Designs prepared during the year total more than ₱2,500,000 in estimates, and the estimated cost of work for which specifications were drawn and advertisement made was ₱552,000. One hundred and thirty-four thousand kilograms of steel were inspected. Over 50,000 square meters of blueprint paper were prepared, most of it for use outside of the Manila office.

(j) Accounting division.—Of the funds required for operating the Bureau of Public Works during the year, a little more than one-fourth were secured directly from appropriations. The remainder were obtained from payment for services rendered. Of the total funds, 8 per cent were expended for the maintenance of buildings, 25 per cent for the purchase and maintenance of equipment, and 67 per cent for administration not charged to projects, and hence not recoverable from appropriations for specific work.

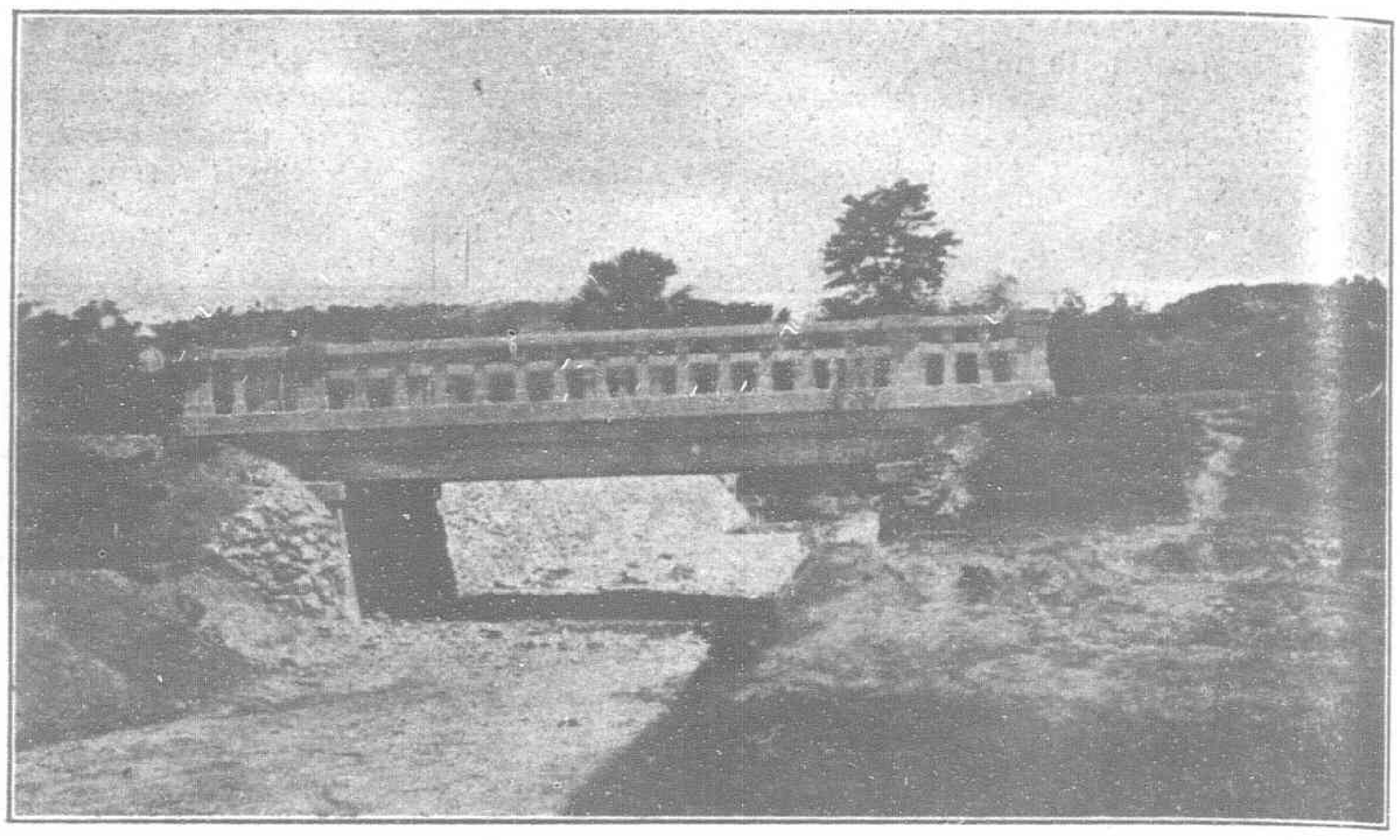
The Bureau is in better financial condition than ever before, due principally to quicker realization on bills receivable, and from greater economy of operation. The quicker realization on bills receivable has been almost wholly brought about by a radical change in the method of charging for the general expenses of supervision on projects. It had been the custom to prorate the actual general expenses of the Bureau to bills rendered after such actual expenses had been determined, and after all bills for a given period, the general expenses for which were known, were ready to be rendered. This was exceedingly cumbersome, and in some cases delayed the issuance of bills until months after the work had been performed, on account of poor connections by mail with outlaying stations. This method of doing business was abolished, and fixed surcharges were established for different classes of work. This not only enables the accounting division of the Bureau to render its bills immediately upon the completion of a job, simply adding to the cost thereof the approved surcharge for the class of work performed, but it promotes harmony with the other Departments and Bureaus of the Government for whom the services are performed, and enables them to estimate with greater accuracy what work will cost them. The Bureau balance shows a surplus for operation for the year of ₱134,327.87, and an increase in plant, purchased from Bureau funds, of ₱263,200.73. In addition to this, there was purchased from special appropriations additional equipment for artesian wells, road construction and automobile service to the amount of ₱211,708.03, making the total increase in the value of plant and equipment controlled by the Bureau of Public Works ₱474,908.76. As a result of these operations the Bureau of Public Works found that it could safely decrease its percentage charged to the provinces for the central administrative expense of the Bureau from seven to six per cent, provided the provinces arranged for the direct payment of the men engaged on the projects. A still further reduction is possible, provided there is no decrease in the amount of money available for public works.

(j) Record division.—About 60,000 communications were handled in this division during the year, an increase of 11 per cent. There was also an increase in the amount of translating and duplicating work performed.

(k) Property division.—Property records have been placed in a condition which permits



TRADE SCHOOL MACHINE SHOP AT BACOLOD, OCCIDENTAL NEGROS.



"LANGTAD" BRIDGE, ON THE NAGA–CARCAR ROAD, ISLAND OF CEBU.

of uniform accounting under the usual governmental safeguards. Measures are being taken which will make this Division an effective unit for quickly supplying equipment and material needed for work from either Bureau of Supply or the Bureau of Public Works stock.

(*l*) *City of Baguio and the Benguet Road.*—Despite the enlargement of one of the hotels in Baguio, extensive cottage and business building, a large increase in the number of tents, and an additional dormitory, the number of sojourners during the summer season of 1911 was much in excess of that which could be comfortably housed. The so-called "Mess," which last year was operated by the Bureau, was this year leased to a private party, who bore all expenses, and paid a fair rent for the building and equipment. There was a large increase in the demand for transportation of materials and supplies. The Bureau of Public Works continued to assume the responsibility for transporting passengers from the lowlands at Camp One to the summer capital. The increased demand on the automobile passenger service was met by the addition of three 14-passenger 50-horsepower cars, and by pressing miscellaneous equipment into service as trailers or otherwise. An addition to the freight equipment in order to handle this class of business was made of four 2-ton 40-horsepower trucks. For the safety of passengers a block system was established over the Benguet Road, and vehicles were run on regular schedule with passing points at the gates. A new garage was built near the electric-light plant in Baguio.

The total expenditures for operating the automobile service, including cost of repairs, were ₱120,273.15, and the total receipts were ₱145,509.07, leaving an excess of receipts over expenditures of ₱25,235.92.

Until near the end of the year the Benguet Road was maintained in good condition at a total expense for old and new work of ₱165,128.45, or ₱5,000 a kilometer. During the latter part of July one of the worst typhoons ever experienced in the Islands passed over the Mountain Province. The amount of rainfall was unprecedented. The damage to the lower part of the road was very great, but it has been found possible at a very reasonable expense to again open the road for automobile traffic. The new work is not of a permanent character, but will answer until such time as the railroad is completed into Baguio.

The principal buildings constructed include a dormitory, 23 large and 45 two-room cottages, a city hall, and a slaughterhouse. In addition to the buildings, the electric-light plant, extension of water supply, telephone system, and miscellaneous landscape work received attention. All city roads were maintained in good condition. Labor available in Baguio was largely that of prisoners from Bilibid Prison, secured at a cost of 52 centavos a day.

ARTESIAN WELLS IN THE PHILIPPINES

For over five years the Bureau of Public Works has been sinking artesian wells throughout the archipelago with the result that today there are over 775 in successful operation and by the end of the present fiscal year the number will reach 1000 at least. As to the effect upon the health of the communities thus served in Pampanga and Bulacan where the first wells were installed in 1906 the health authorities report a falling off in the mortality rate of 50%. It is estimated that even with increased facilities it will take five years to supply even the wells most urgently needed.

The Bureau has at present eleven portable steam drillers and 45 hand power or jet rigs, while 14 traction deep well outfits are at present being purchased in the United States.

The equipment now operating comprises one Pierce portable supplied by the Pierce Engineering and Oil Well Supply Co., one "Standard," four "Columbia" No. 5, and three "Columbia" No. 10, supplied by the Oil Well Supply Co., Pittsburgh, and two Keystone portable, supplied by the Keystone Driller Company of Beaver Falls, Pa.

The superintendent in charge of this important work is J. W. Vickers, an expert who has been with the Bureau since 1906.

PHILIPPINE RAILWAYS

During the fiscal year ended June 30, 1911, continued activity in construction marked the railway program. According to the report of the Supervising Railway Expert, there were in all 68.3 kilometers of grading completed, 105.6 kilometers of track laid and 98.7 kilometers of line opened during the year. Of this the greatest activity was noted in the extension of the Manila Railroad Company's lines with 52.1 kilometers of grading completed, 89.6 kilometers of track laid and 53.5 kilometers of line opened. The Philippine Railway Co. concluded grading on 14.8 kilometers, laid track 14.8 kilometers, and added 43.8 kilometers of open line during the year. The Manila Electric Company added 1.4 kilometers of line to their system. At the end of the year there were in all 1,804 47 kilometers of line authorized, 923.5 kilometers constructed and in operation, 51.1 constructed and not in operation, and 830.1 kilometers to be constructed.

Of the authorized northern lines of the Manila Railroad Company, in all, 672.1 kilometers, 472.2 kilometers have been built leaving 89 9 kilometers to be constructed and of the 765.6 kilometers of the southern Luzon lines authorized built by this company 199-6 kilometers have been completed, leaving 566 kilometers to be built to complete the present program.

At the end of the fiscal year out of a total of 358.6 kilometers authorized in the Visayas the Philippine Railway Co. had completed and in operation 211 kilometers leaving 156.7 kilometers to construct. Of these lines the proposed line in Negros has not yet been undertaken.

A franchise for the installation of an electric railway system in Cebu was granted to Simplicio Rodas, representing local capital who was the most satisfactory bidder in response to advertisements for proposals. In concluding his report Mr. Goodale says:

"The results of operation of the several railroad lines show that the material prosperity of the islands in railway earnings last year continues and the probabilities are that it will continue indefinitely"

THE MANILA RAILROAD COMPANY—*Construction Northern Luzon*—On the Dagupan, San Fernando line, an extension of the Manila-Dagupan or Northern Trunk line which when completed will be 73 8 kilometers in length was in operation for 43 0 kilometers at the end of the fiscal year and of which 6.5 kilometers were opened during that period.

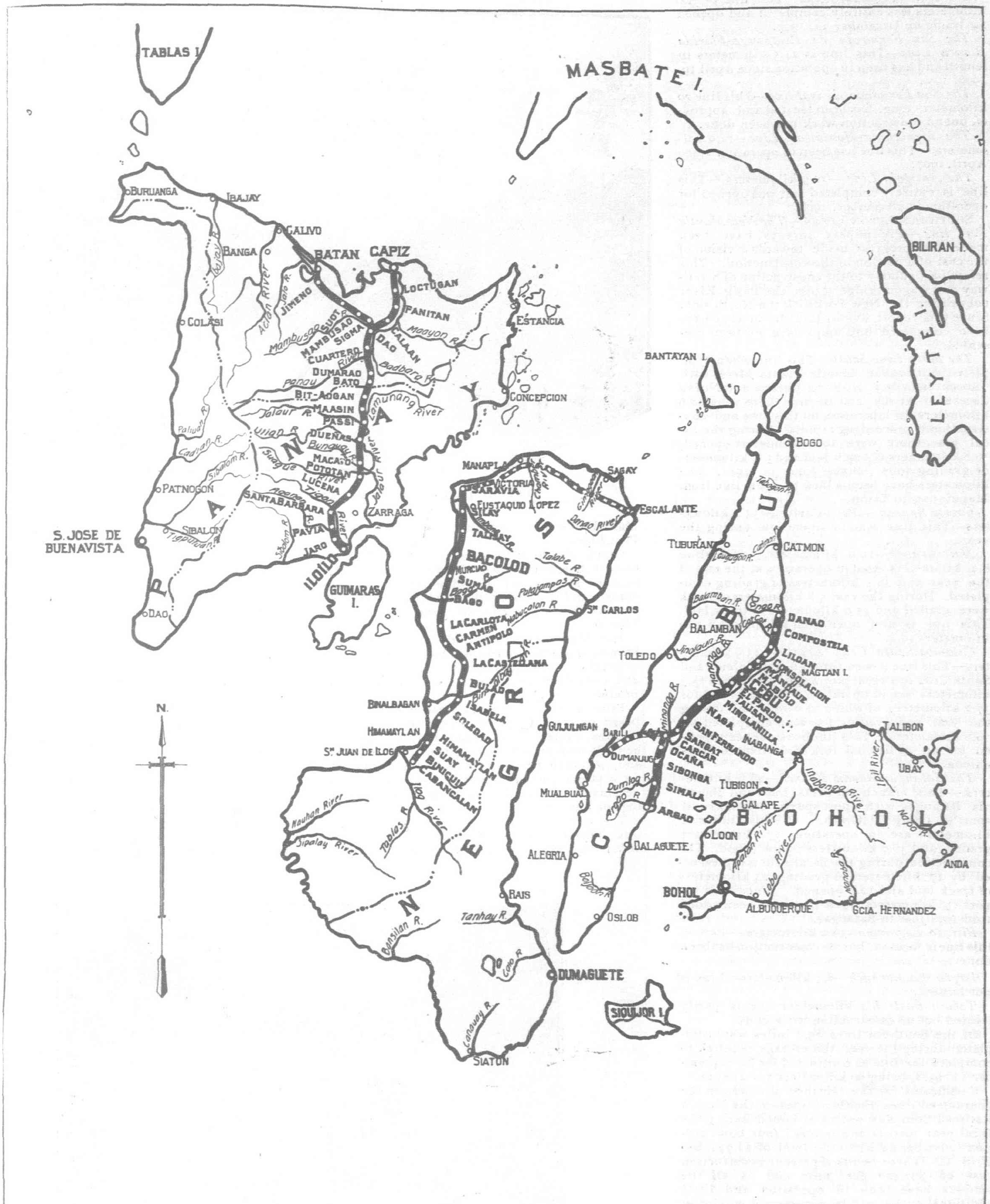
Construction accounts were closed on the 43 kilometers on October 1, 1910.

Baguio-Aringay line—This proposed line will be 65 kilometers in length connecting the summer capital with Aringay, a point on the Dagupan and San Fernando de Union Line, via Galiano and the Naguilian trail. The route has been located but final plans have not yet been approved. This line when completed will carry the traffic of the present Camp One line that connects with the automobile service on the Benguet road from Dagupan.

The Camp One line—This line connecting Dagupan with the Benguet road is 20.5 kilometers in length, of which 19.4 kilometers have been in operation since December 31, 1909. The balance will very probably not be constructed in view of the projected Baguio-Aringay line.

The Paniqui-Tayug Line—This is a branch of the main north line, of which 15 kilometers out of a total of 50.5 kilometers is in operation. Grading has been completed for 34 kilometers and the track laid for 29.4 kilometers. The progress made on this branch during the year was the laying of 14.4 kilometers of track. Fifteen kilometers of open line were added since the report was submitted.

The San Miguel-La Paz line—This line is 18.4 kilometers in length, has been located but will be revised. It is also a branch of the North main line.



ORIGINAL SYSTEM OF RAILWAYS FOR THE VISAYAN ISLANDS—NO WORK HAS BEEN DONE IN NEGROS OR ON THE BRANCH LINES IN CEBU AND PANAY.

The Daic-Magalang Line—This line of 9.0 kilometers was entirely completed and opened for traffic on December 20, 1907.

The San Fernando de Pampanga-Florida Blanca Line—This line is 24.5 kilometers in length and has been in operation since April 10, 1908.

The San Fernando-Arayat line—This line 20 kilometers long, has been located and approved but no construction work has been done.

The Mariquina-Montalban Line—12.9 kilometers.—This line has been in operation since April, 1907.

The Antipolo Line.—12.9 kilometers.—This line is entirely completed and was opened for operation in December, 1908.

SOUTHERN LUZON LINES.—*The New Manila Port line.*—Preliminary surveys have been made and progress made towards division of the cost of a portion of the construction. This refers particularly to the construction of a railway and wagon bridge across the Pasig River connecting the New Port with the North side. Since this report was written the surveys have been completed but maps have not been presented.

The Main Line South—This line when completed will connect Manila (Santa Mesa) with Tabaco in Albay via Suta, Lucena and Nueva Caceres. At the end of June there were 88.6 kilometers in operation on this line and construction is proceeding rapidly. During the fiscal year there were 19.2 kilometers opened, 16.8 kilometers of track laid and 7.8 kilometers of grading done. Since June 30, 1911, 12.1 kilometers have been added to open line from Maguinpan to Tiaon.

Cavite Branch—(Paco-Cavite)—33.2 kilometers—This line was in operation during the year.

Naic Branch—19.9 kilometers.—Of this line 6.2 kilometers were in operation at the end of the year and 18.1 kilometers of grading completed. During the year 5.8 kilometers of track were graded and 15.0 kilometers of track laid. This line is now open from kilometers 6.2 to kilometers 19.4.

Calamba-Santa Cruz Branch—43.9 kilometers—This line passes through Magdalena and Santa Cruz to Pagsanjan, Laguna, of which 15.3 kilometers are in operation. Track is laid for 37.2 kilometers, of which 18.8 were laid during the year and grading has been completed for 28.6 kilometers. This line has since been opened for an additional 16.8 kilometers to Magdalena.

The Batangas-Bauan Branch—46.6 kilometers.—This branch connects Luta and Bauan via Batangas with a port spur at Batangas and spur to Camp McGrath. Of this line 22.1 kilometers are in operation, 37.1 kilometers graded, and 36.6 kilometers of track laid. The construction during the fiscal year is represented by 17 kilometers of grading, 24 kilometers of track laid and 12.8 opened. Since this report 15 kilometers open line have been added from San Jose to Batangas.

Pili to Lagonoy.—49.9 kilometers.—Part of this line is located, but no construction has been done.

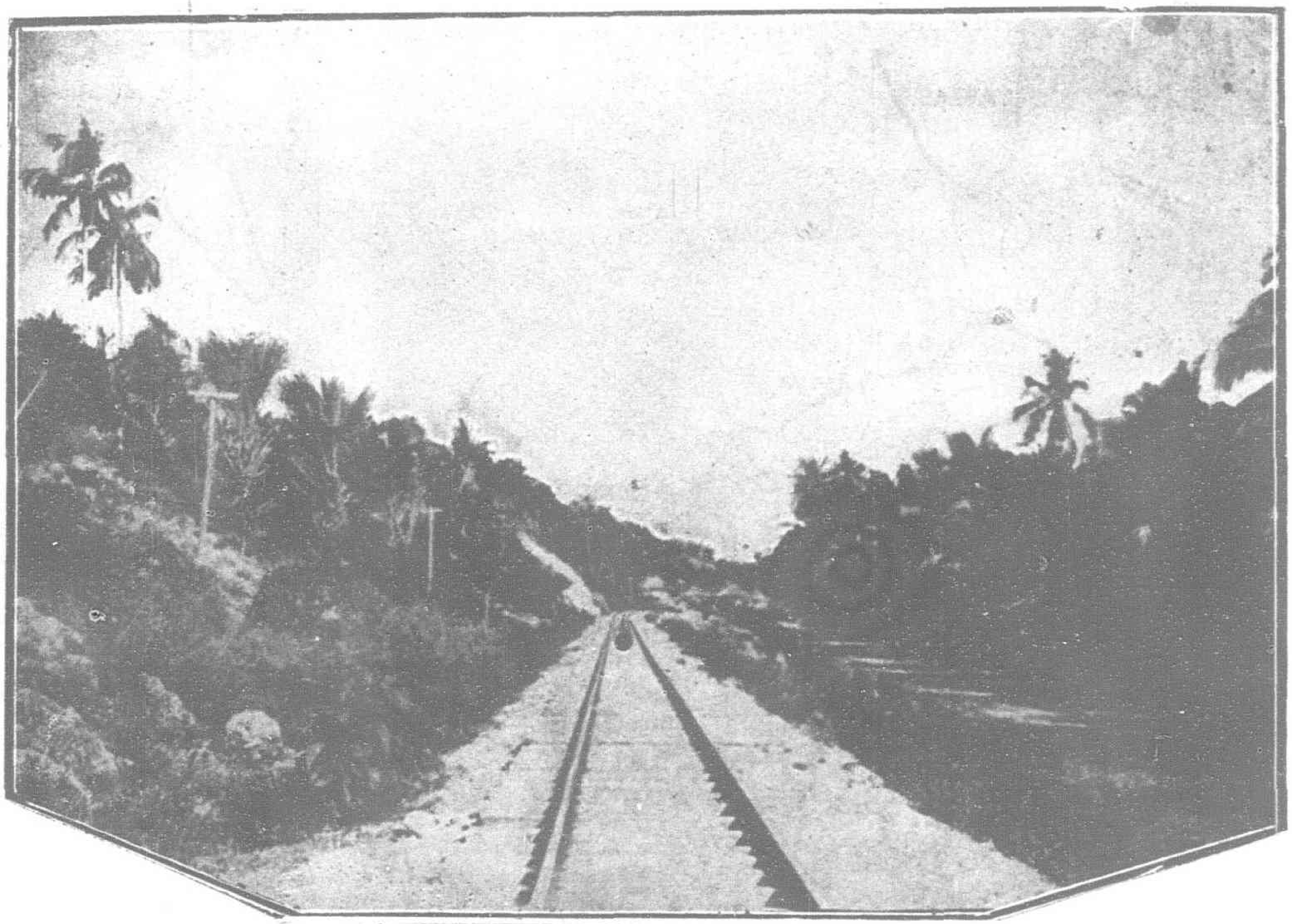
Lagao East branch—6.4 kilometers—Line is not located.

Tabaco East—6.4 kilometers line is partly located but no construction work done.

Of the Southern lines 89.6 miles were completed during the year, the average required to complete the line as contracted for by September 12, 1918, being 90 kilometers per annum.

Certificates for the issuance of bonds on the guaranteed lines (Southern lines) of the Manila Railroad Company were first issued during the fiscal year 1910-11 and covered four bond section (20 miles each) to the total of $2,995, 800 U. S. C. These bonds represent construction cost of $37,400 per mile and as all the sections have been in operation and little additional outlay will be necessary it will bring the cost per mile to about $40,000 U. S. C. The net earnings of the sections referred to since the opening to traffic have been sufficient to more than cover all fixed charges.

It is expected that by the end of the fiscal year 1911-12 all the Southern branch lines in Cavite, La Laguna, and Batangas provinces will be completed and work concentrated on the Main line south, the Baguio line, and the New Port Line.



SECTION OF TRACK NEAR DANAO, CEBU, ON THE PHILIPPINE RAILWAY

On the Northern lines work on the Main line towards San Fernando de Union will continue, another section will be added to the Tayug branch, and it is hoped that work may be begun on the San Fernando de Pampanga-Arayat branch.

The Main line south and the Santa Cruz branch of the Southern lines have been opened to points within the copra producing districts and a considerable traffic is expected from this product.

From a preliminary examination of the proposed route from Lucena, Tayabas, to Nueva Caceres, Camarines, it is found that the line can be built without much heavy construction work and, although the country is thinly populated for a larger part of the way, considerable business may be obtained in shipments of copra, and logs or lumber.

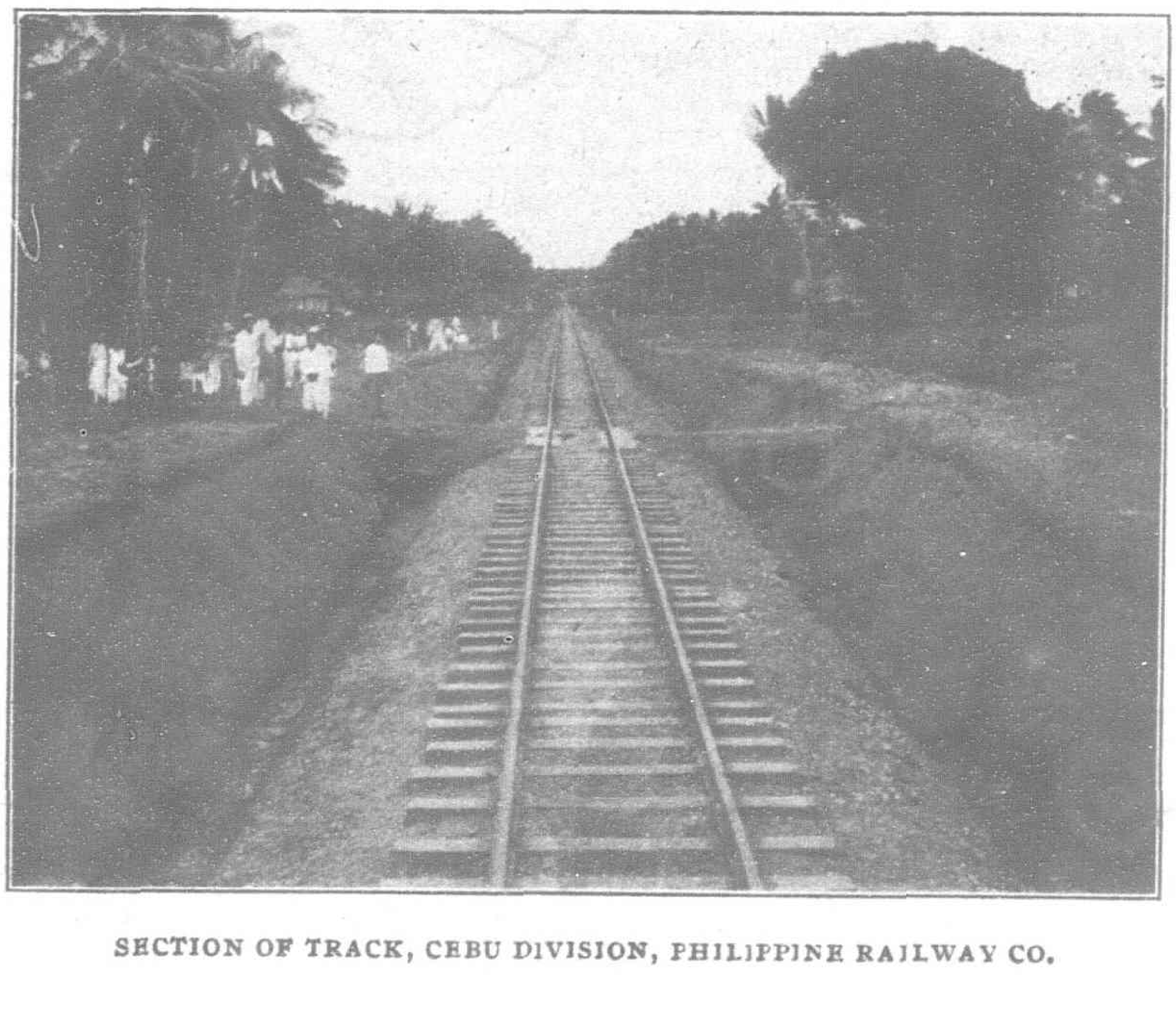
The work of finally locating the connecting link between Lucena and Nueva Cáceres is under way and with its completion practically all of the location of the Southern Lines of this company will have been determined.

Manila Railroad—Northern Lines.—New 65 lb rails were used in replacing the 45 lb rails on the Manila Railroad lines. Very little permanent bridge work was executed on operated lines but the track was kept in excellent condition. The average kilometrage for the calendar year 1909 operated by this company was 409 1 compared with 342.7 the previous term.

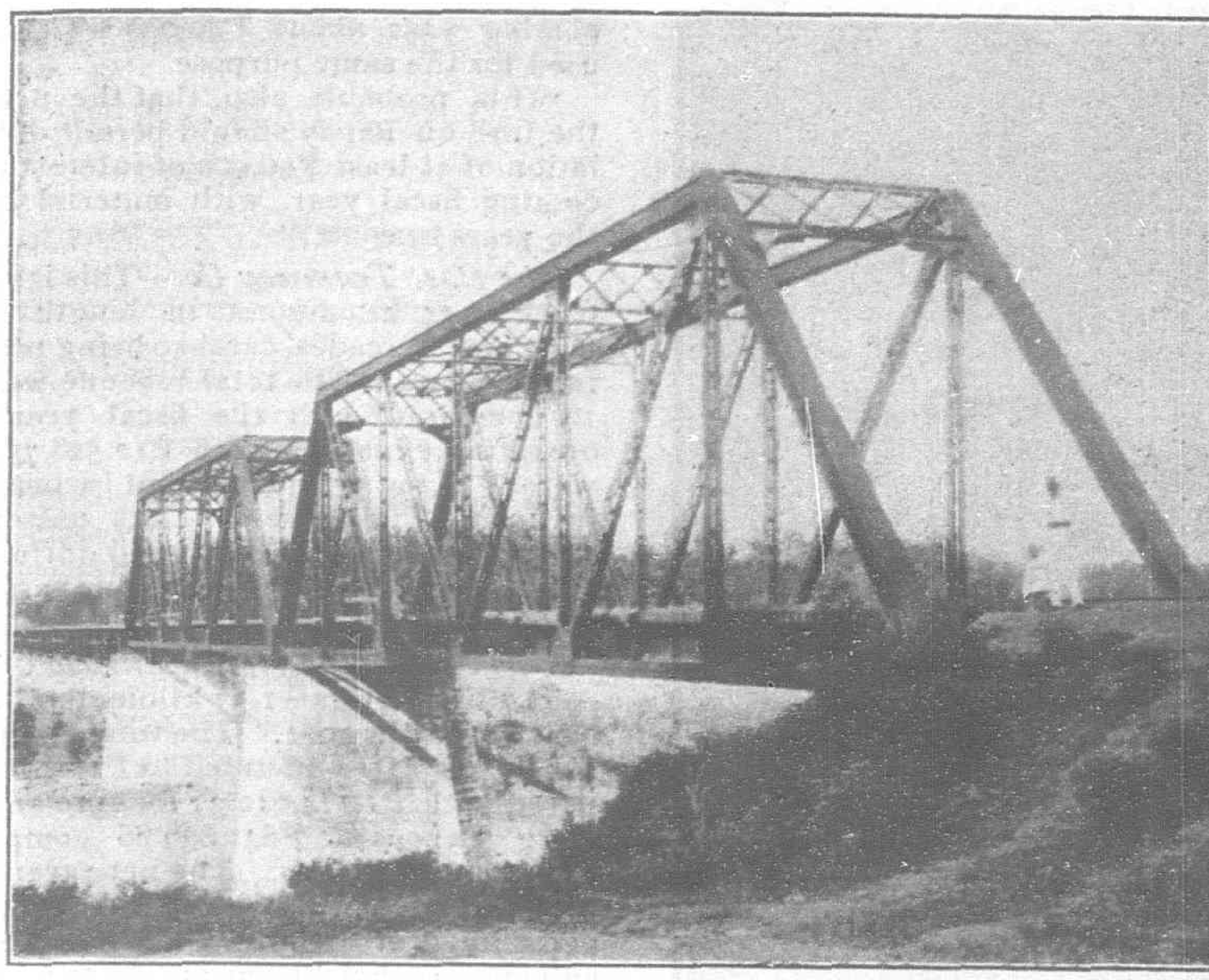
The total revenue from transportation for the calendar year 1910, was ₱2,452,730.21 compared with ₱2,035,025.75 in 1909 and revenue from other sources ₱14,857.09 as against ₱12,597.95 the previous year. The credit from joint facilities on the guaranteed lines amounted to ₱27,198.30 in 1910.

The operating expenditure for the calendar year 1910 amounted to ₱1,072,974.47 as against ₱900,779.79 the previous term. The percentage of operating expenses to gross operating revenue was 43% in 1910 as against 44% 1909.

The net revenue for the year 1910 was ₱1,401,597.85 as compared to ₱1,136,605.82 in 1909.



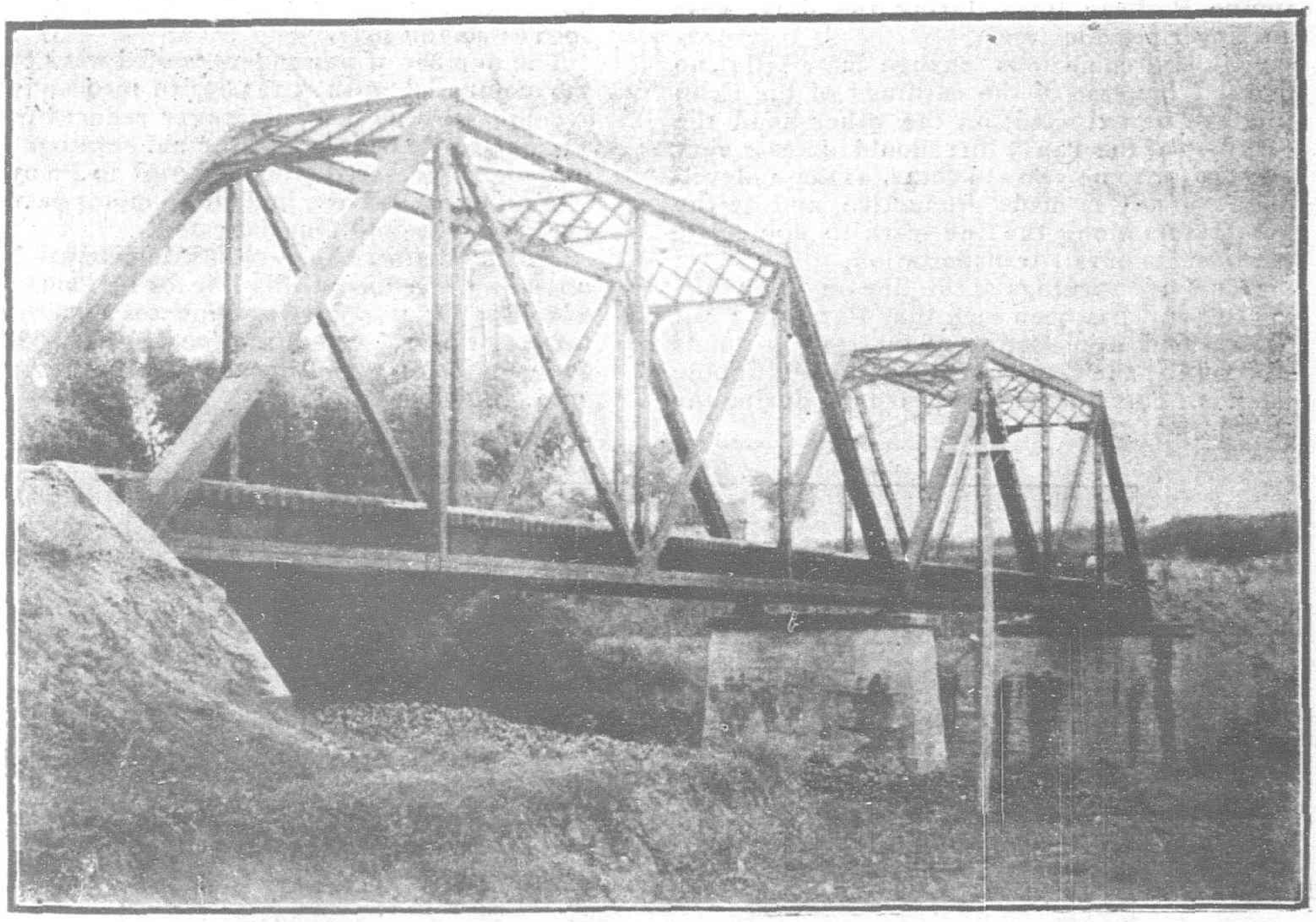
SECTION OF TRACK, CEBU DIVISION, PHILIPPINE RAILWAY CO.



PASSI BRIDGE, PANAY DIVISION, PHILIPPINE RAILWAY CO.

In addition to the above for 1910, revenue to the amount of ₱297,512 20 was realized by the company from separately operated properties, interest on securities, loans, etc.

A statistical table covering the operations of this system show a decrease in passenger and freight revenue by the train kilometer, while there is a decrease in the operating expenses estimated on that basis. On the other hand, there has been a marked increase in the passenger revenue by the kilometer of line although the freight revenue by kilometer of line shows a decrease. The net revenue per train kilometer was ₱1,130 in the calendar year 1910, against ₱1,142 in 1909, while the net revenue per kilometer of line was ₱3,475.12 in 1910 as against ₱3,309.74 in 1909.



BRIDGE AT CARCAR ON THE CEBU DIVISION PHILIPPINE RAILWAY CO.

The revenue received per kilometer per passenger was the same as in the previous year, but the revenue per tonne of freight per kilometer fell off from ₱0.0342 to ₱0.0269. The average amount received per tonne of freight, however, increased from ₱2.1952 to ₱2.276.

The average haul in kilometers per passenger was 26.30 in 1910 as against 28.58 in 190? and the average haul per tonne of freight was 84.52 in 1910 as against 65.36 the previous year.

In all there were 59,133,933 passengers hauled one kilometer in 1910 as against 57,780,190 in 1909 while there were 31,564,059 tonnes of freight hauled one kilometer as against 22,912,071 in 1909.

The equipment for the Northern lines follows: 64 locomotives, 8 first class passenger cars, 25 first and second class composite, 10 second class, 68 third class, one parlor car, three inspection cars, 727 freight cars and 153 miscellaneous cars, an increase of 100 in the last.

Southern Lines—The total transportation revenue for the calendar year 1910 amounted to ₱201,523.39 to which is added ₱346.34 from other sources. The total operating expenses for the year amounted to ₱134,459.02, the percentage of operating to gross revenue being 67.

The equipment of the southern lines in operation follows: 21 locomotives, 5 first and second class composites, 28 third class, 190 freight cars and 126 miscellaneous.

PHILIPPINE RAILWAY LINES—*Cebu Line*—At the end of the fiscal year there were a few items of construction work unfinished in the island of Cebu. Up to the end of the fiscal year the total of certificates for issuance of construction bonds amounted to $3,268,000 U S. C. The length of this line is 95 6 kilometers or 59.4 miles and bonds have been issued at the rate of $55,017 gold per mile. No construction work has been done on the line from Carcar or Sibonga to Barili and Dumajug across the island.

Panay Line—116.3 kilometers—The grading so as to permit the completion of track laying from Iloilo to Capiz was completed August 10, 1910, and track laying was finished on August 11, 1910. Authority was given for commercial operation from terminal to terminal on August 12, 1910. During the fiscal year grading, ballasting, and bridge building has been under way and at the end of the fiscal year 11.4 kilometers of final ballasting remained to be done, piers at Lupus, several water stations, and a large number of miscellaneous items. No construction work was undertaken on the Dao-Bataan line.

The total of certificates for issuance of bonds on this line amounted to $4,839,000.00 averaging $ 66,930 gold per mile. There were 43.8 kilometers put in operation in Panay during the fiscal year. The Philippine Railway Company's lines are 1 07 meter (36") gauge.

Operation—Cebu—95.6 kilometers—Freight revenue for 1911 showed an increase from ₱54,617 95 to ₱64,538.16 and passenger revenue from ₱171,869.16 to ₱199,062.00. Excess baggage revenue was ₱277.31 in 1910 and ₱276.79 in 1911. Mail carrying revenue dropped from ₱7,536.60 to ₱4,997.08 and express revenue increased from ₱2,106.52 to ₱2,999.06. The total revenue from transportation was ₱272,168.11 in 1911 as against ₱236,435.84 in 1910, an increase of ₱35,732.27.

Including miscellaneous revenue of ₱13,606 93 in 1911 as against ₱1,320.56 in 1910, the total increase over the previous fiscal year was ₱48,018.64 or over 20%.

The total operating expenses amounted to ₱198,150.65 as against ₱197,415.26 in 1910 and the net operating income was ₱87,102.89, an increase of ₱46,761.75 over the previous year. The percentage of operating expenses to gross revenue was 69 as against 83 in 1910.

The passenger revenue per train kilometer increased from ₱0 6549 in 1910 to ₱0 7536 in 1911 and freight revenue per train kilometers from ₱0.1967 to ₱0.2345. The total revenue per train kilometer increased from ₱0.8563 to ₱1.0382.

Operating expenses increased, from ₱0.711 per train kilometer to ₱0.7199 while the net revenue per train kilometer increased from ₱0.1452 to ₱0.3183.

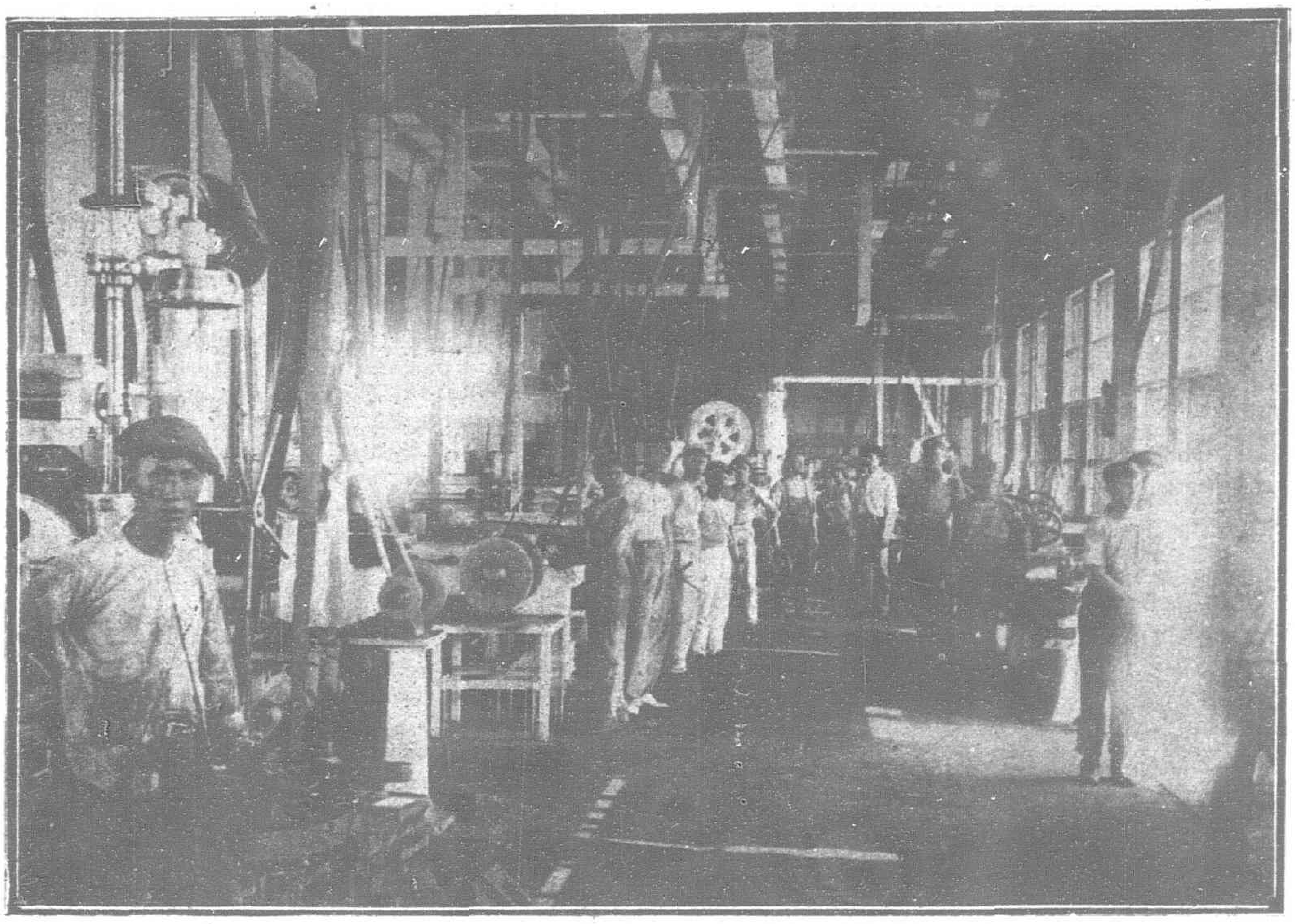
The passenger revenue per kilometer of line for the year was ₱2,168.78 as against ₱1,901.86, while the freight revenue per kilometer of line was ₱675.08 in 1911 compared with ₱571.32 in 1910. Operating expenses per kilometer of line was ₱2,072.70 compared with ₱2,055.01 in 1910 and net revenue per kilometer of line increased from ₱421.98 to ₱916.57 or over 100%.

There was decrease from ₱0.0184 in 1910 to ₱0.0174 in 1911 in the amount received per kilometer per passenger and also from ₱0.3783 to ₱0.3455 in the amount received per passenger, while the amount received for freight per ton per kilometer increased from ₱0.0584 to ₱0.0916 and again the amount received per tonne of freight decreased from ₱1.6849 to ₱1.6152.

The average haul per passenger in 1911 was 19.93 kilometers against 20.51 in 1910 and the average haul per tonne of freight in 1911 was 17.64 kilometers as against 28.85 the previous term.

The number of passengers hauled one kilometer was 11,469,101 in 1911 as against 9,316,005 in 1910, an increase of 2,151,096 and there was a decrease in the tonnes of freight hauled from 935,158 in 1910 to 704,889 in 1911.

The equipment of the Cebu line comprised at the end of the fiscal year, 1911, six locomotives, 25 passenger cars, 53 freight cars and one car in the company's service, an increase of one loco-



PHILIPPINE RAILWAY MACHINE SHOPS AT ILOILO

motive, three passenger cars and five freight cars over the previous term.

The Island of Panay—The average operated kilometrage for 1910 was 74.55, and for 1911, 110.2. On this line there has been a marked increase in revenue and reduction in the ratio of operating expenses to gross revenue. Comparisons of returns for the fiscal year 1910 and 1911 show an increase for the latter year for freight revenue from ₱28,984 27 to ₱62,203.98 and for passenger revenue from ₱112 640.66 to ₱206,348.00. The total revenue showed an increase from ₱146,180.43 to ₱273,533.82, an increase in all of ₱127,345. 22, while the operating expenses increased from ₱111,180.43 to ₱171,420.35 or ₱60 239 92, while the net income increased from ₱35,008 17 to ₱102,113.47, an advance of ₱67,105.30 or almost 200%.

The following increases are shown in revenue: passenger revenue per train kilometer from ₱1.1592 to ₱1 2617; freight revenue per train kilometer from ₱0.3320 to ₱0.4143, while the operating expenses per train kilometer was reduced from ₱1. 441 to ₱1.0637 and the net revenue per train kilometer increase from ₱0 3603 to ₱0 6336.

The revenue per kilometer of line increase for passenger traffic from ₱1.510 94 to ₱1,874.65 and for freight ₱375.37 to ₱564 56 making an increase of revenue for each kilometer from ₱1,960.95 to ₱2,482.60.

The operating expenses per kilometer of line was increased from ₱1,481.35 to ₱1,555,82, leaving an increased net revenue per kilometer of line of ₱926.78 for 1911 compared with ₱469.60 for 1910 or an advance of about 96%.

There was a decrease from ₱0.0179 to ₱0.0174 in receipts per passenger per kilometer and an increase from ₱0.3841 to ₱0.4079 in the amount received from each passenger, while there was a decrease from ₱0.1078 to ₱0.0855 received per tonne of freight per kilometer and from ₱3 5218 to ₱2.8466 in the receipts per tonne of freight handled.

The average haul per passenger increased from 21.51 kilometers to 23.49 and an increase from 32.68 to 33 28 kilometers in the average haul per tonne of freight.

The number of passengers hauled one kilometer increased from 6,012,752 to 11,464 610 and the tonnes of freight hauled one kilometer increased from 268,974 tonnes to 727,395 tonnes, a remarkable improvement on the previous year.

Equipment—The Panay line at the end of the fiscal year had nine locomotives, 20 passenger cars, 102 freight car, and 48 cars in the company's service.

Commenting on the increased earnings of the Philippine Railway lines the Supervising Expert says:

"It will be noted there has been a considerable increase in the earnings of the two Philippine Railway lines during the fiscal year 1911 over previous years.

"Unless conditions change materially no marked increase of the earnings of the Cebu line can be expected; on the other hand the earnings of the Panay line should increase very largely for some years to come, as the undeveloped country is made productive and as the inhabitants along the line learn to appreciate the benefits of rail transportation.

"The net earnings of the line on Cebu during the year has been such that ₱27,444.03 can be used in cancellation of interest on bonds paid out by the Government of the Philippine Islands. This line ought to earn net during the coming year about ₱40,000 which should be used for the same purpose.

"It is probable also, that the net income of the line on Panay should permit of the cancellation of at least ₱60,000 of interest during the coming fiscal year, with material increases in the years to come."

The Daet Tramway Co.—This is a 0.91 gauge track 7.24 kilometers in length connecting Daet and Mercedes, carabao being used for hauling the cars. The total revenue was ₱17,369.19 compared with the fiscal year 1910; the operating expenses were ₱12,528.75, expenses were ₱14,179 37 and the net income ₱4,840.29 in 1910. There were 14,415 passengers and 4,637 tonnes of freight carried during the year. The equipment comprises four passenger cars, 20 freight cars, and 22 bulls.

The Manila Electric Railroad & Light Co.—64 7 kilometers—1.37 kilometers of line were constructed in 1911. The total revenue for the fiscal year 1911 amounted to ₱1,244,048 35 compared with ₱1,124,612.31 for 1910 and the operating expenses ₱641,839 86 compared with ₱606,211.34 in 1910. The net revenue for 1911 was ₱602,208.49 and for 1910, ₱518,400.97. The percentage of operating expenses to gross revenue was reduced from 53.9 to 51.6 in 1911.

The total number of paying passengers carried was 14,168,332, an increase of 1,790,084 over 1910, while the average earnings per passenger was reduced from ₱0.0908 to ₱0.0453 and the net earnings per passenger were reduced from ₱0 0419 in 1910 to ₱0.370 in 1911.

Equipment.—The company has 104 motor cars, one work car, one wrecking car, and a water sprinkler.

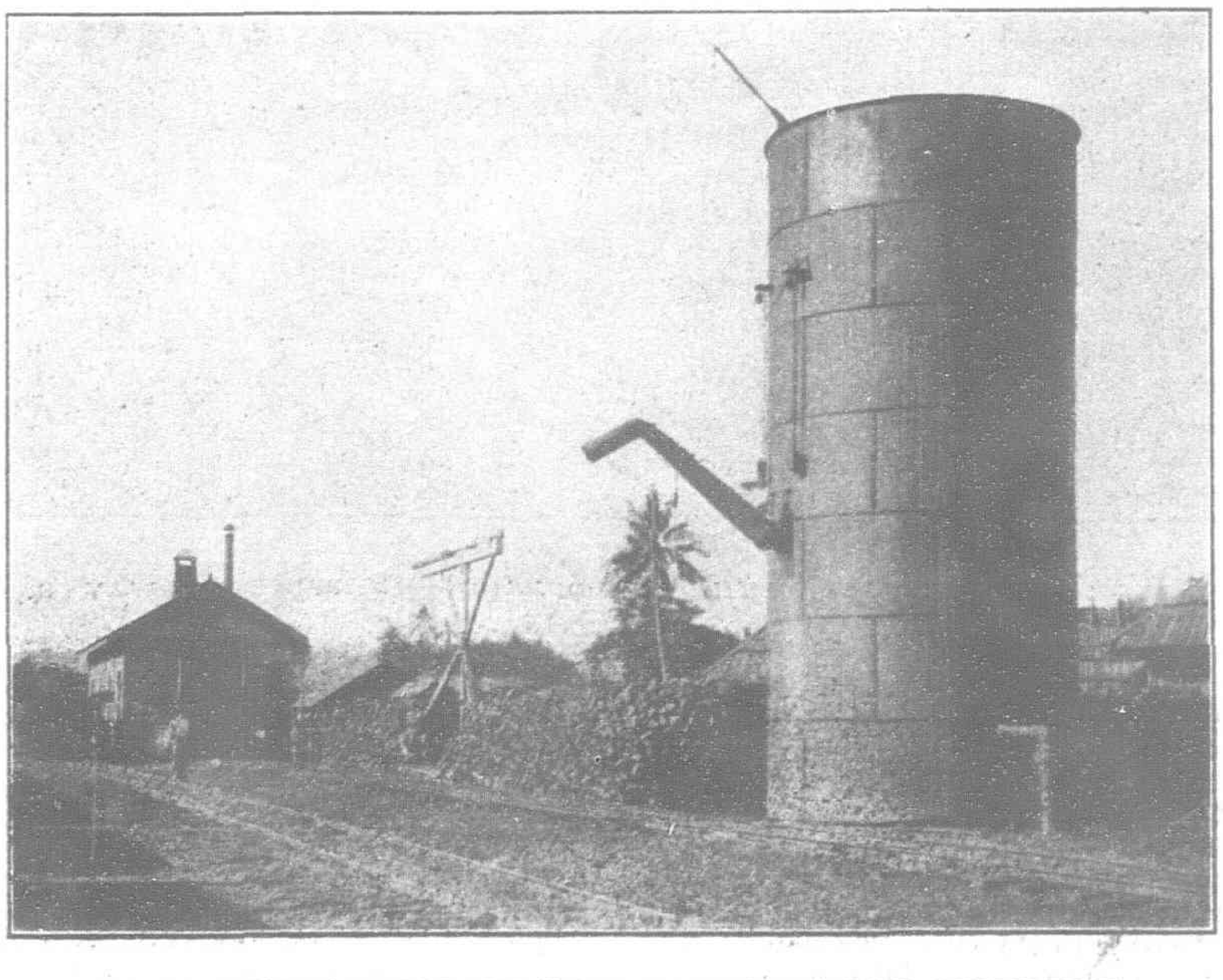
Manila Suburban Railways Co.—11.6 kilometers.—The total revenue for the fiscal year 1911 was ₱251,565.03 as against ₱215,670 40 the previous year and the operating expenses ₱116,384.18 as against ₱123,441.22 for 1910, the net income being ₱135,214.85, an increase of ₱42,985.67 over the previous year.

The percentage of operating expenses to operating revenue was reduced from 57.3 in 1910 to 46.3 in 1911.

The number of passengers carried was 4,073,730 compared with 3,173,692 in 1910 and the average earning per passenger reduced from ₱0.0679 to ₱0.0617, while the net earnings per passenger increased from ₱0.0291 to ₱0.0332.

Equipment.—This includes 6 motor passenger, 3 freight, and four flat cars.

Tarlac Railway Co.—20.58 kilometers.—The operating revenue on this line for 1911 amounted to ₱33,384.41, operating expenses ₱15,886.12 taxes ₱1,612.16, operating income ₱15,886.12. Percentage of operating to operating revenue 47.6.



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THE PUBLIC SCHOOL HELPS DEVELOPMENT OF EFFICIENT SKILLED LABOR IN THE PHILIPPINES

Opportunities for development of new or what may be called creative enterprises in the Philippines have attracted more or less attention during the last few years and as activity in this line progressed more definite and reliable data became available as to the adaptability and efficiency of the Filipino as a laborer. The general consensus of opinion among those who have solved their own labor problems respectively is an endorsement of his qualifications either in a skilled or an unskilled capacity.

Manila is naturally the largest manufacturing center of the archipelago, but in many lines antiquated methods prevailed previous to American occupation. This was true of the leather goods manufacturing industry. Previous to 1900 there were no high grade harness used in the islands. A number of small shops were engaged in making a crude harness that served the local and provincial trade, but with the use of better vehicles came the demand for good harness.

The opportunity for a modern shop was soon realized by John T. Pickett, an American familiar with the prevailing practice in leather goods manufacture in the United States. He opened a small shop in 1900 and proceeded to study local needs. He personally supervised the work turned out and in less than two years was obliged to double his shop capacity. From very limited patronage in 1900, his business for the year 1911 has grown into a good thriving manufacturing and wholesale establishment.

During all this time Mr. Pickett has utilized Filipino labor exclusively. His most skilled workmen were developed from raw material and he is free in declaring that by careful training and supervision, he has secured an efficiency equal to that of American workmen in America. In an interview on his experience with Filipino labor, Mr. Pickett said:

"I have never doubted the capacity of the Filipino to develop into a skilled laborer, under favorable conditions of employment, accorded fair and sympathetic treatment, carefully trained, and intelligently and effectively supervised. If I had the opportunity to choose laborers from all the countries in the Orient I would select the Filipino as the most desirable and efficient.

"At one time I feared that the government by its liberal program of education was going to spoil the present generation for industrial work. But that was before I was given an opportunity to try out any of the Filipino boys who had passed through the higher grades of our public schools. During the last four years, I have demonstrated to my own satisfaction that the boy who has a public school education is more amenable to intelligent training and develops efficiency twice as rapidly as the boy who has not attended the public school and has no knowledge of English. He is more familiar with our methods, understanding with greater ease, and absorbing more readily the modern shop atmosphere.

"My experience with the more or less educated Filipino boy has made me a firm advocate for a most liberal educational program. Every industry will be benefited and the Filipino, himself, will be better equipped to secure greater return for his labor. The school may turn out many boys who, without opportunity to put their training to practical use at once, may become inefficient members of the community, but if apprenticed at once to acquire knowledge of, and become skilled in, some line of industrial work they will prove, under the favorable conditions of employment I have referred to, as efficient in this climate as any other Oriental laborer that has come under my observation here.

"In developing skilled operators I prefer for material the absolutely untrained Filipino with a public school education to one trained in antiquated methods, since the latter finds it difficult to adapt himself to the more rigorous demands of the modern plant.

"Much has been said of irregularity of service of Filipino operators and to some extent this remains true, but not in my experience. I introduced a merit system by which annual awards are made and so greatly interested have my employes become that it is now a rare exception when one of them fails to report daily for duty.

"One has to go slow in inaugurating any reforms affecting remuneration, even should the reform proposed be in the employes' favor. I have been endeavoring to interest them in working by the piece by which the more adept would be able to earn from twenty to forty per cent more than their regular pay. This proposed innovation is viewed generally with suspicion and up to the present time has been rejected. I am satisfied, however, that this basis of remuneration will ultimately prove acceptable. In every phase of the development of this skilled labor the greatest patience must be exercised, but, in the end, any employer of labor will find that it pays.

"I have an average of 50 skilled operators on my payroll, all of whom have been trained in the shop under American supervision. I am satisfied that I could not have secured better results in the state of Colorado with local skilled labor available there measured by efficiency, and I am satisfied that no enterprise in the Philippines need languish for the lack of competent labor, if its direction studies local conditions, realizes that it must proceed intelligently to the training of the material at hand, and that patience and sympathetic treatment is necessary to overcome native prejudice and to inspire confidence in modern industrial methods, which to them are new, and, to say the least, rouses their suspicion. I have every reason to expect continued success in this country."

BRITISH NORTH BORNEO DEVELOPMENT.

The Annual North Borneo Dinner, held December 13, in the Hotel Cecil, London, was the occasion for a number of interesting speeches covering the history of, and progress made by, the British administration of the colony under the direction of the North Borneo Company in the development of the country which has been particularly marked during the last few years. We quote an excerpt from the address of the Chairman, Sir West Ridgeway, which gives expression to the aggressive attitude of the officials and their confidence in North Borneo's future. He said in part:

"In the last ten years our revenue has donbled. It was in 1900 £68,000; now it is £144,000, and if you include the windfall of land sales during 1910 the revenue for 1910 was £221,000. Our population has doubled. Our notice population has more than doubled. In 1900 there was very little telegraphic communication: now we have got eight hundred miles of telegraph. In 1900 railway construction was only just begun; now we have got 128 miles of railway fully equipped. Taxation, there is practically none. The native population pay, or do not pay, a trifling poll tax, and the white population, excepting custom duties, which are on the same scale as in India and Ceylon, pay nothing. There is no income-tax, no super tax—(laugther)—no land tax. In the whole territory we have only got two lawyers. There is only one newspaper, and that is official. Now, can you imagine a more delightful state of things? Should not the words be inscribed in gold on the entrance to Jesselton Harbour: 'If there is a heaven on earth, 'tis this, 'tis this." Well, so far so good, but we confess that we have merely scratched the surface, that we must delve much deeper if we would wish to justify our existence. We possess a royal charter, one of the most extensive charters that was ever granted by the Crown. That involves duties and responsibilities. We are not a trading company. We are a government, an administration. That is why I hold this position. The Colonial Office leave us alone so long as we behave ourselves, but they expect us to be true to the traditions and the policy of the Empire, and we accept that obligation. I think we have shown evidence of our good faith. To fill the last vacancy that occurred on our board we selected the late Under Secretary of State for the Colonies, Sir Montagu Ommanney, a most valuable colleague; and the other day, when the Governorship fell vacant, when Mr. Gueritz after 25 years of loyal, strenuous service, decided that it was time that he sought peace and repose, we selected as his successor Mr. Ellis, late Auditor-General of Ceylon, and one of the ablest Colonial servants that it has been my good fortune to meet. And I think that we may congratulate ourselves on the fact that the present Under Secretary of State for the Colonies is that distinguished man, Sir John Anderson, who, as Governor of the Straits Settlements, was also High Commissioner of those Protectorates which include North Borneo. I think we may regard him as a friend and rely on him for advice, sympathy, and assistance. Gentlemen, this company has done its best, but it has had to cut its coat according to its cloth.

"Until recently its means have been scanty, but thanks to the development of the country and to the railway which Mr. Cowie caused to be constructed with so much sagacity and foresight, and last, but certainly not least, thanks to the rubber boom, we are now on velvet. Now that rubber boom has expended itself, and I am not altogether sorry. I am not altogether sorry that the Eastern mirage, with all its illusions, has disappeared, for there now remains the reality of a sound and stable industry on firm foundations, which I believe will flourish more and more now that the price of rubber has fallen and placed this article within the reach of many interests which before could not afford to use it. But I must not speak disrespectfully of the rubber boom. It not only filled our treasury, but owing to it there are now 23 rubber companies operating in our country. They have a capital of £3,000,000, which they are expending not only for their own benefit, but for the benefit of the country, and I may tell you that the prospects of those companies are excellent. It has been proved that the soil and the climate of North Borneo are particularly congenial to the rubber plant, and that its growth has been phenomenal. But we have not all our eggs in one basket, as you will see from those bioscopic views. We have got our industries. But all I will say now is that our policy is a policy of progress, of vigorous development of the resources of the country. I leave for North Borneo in a few days, and I hope on my return the Court will be able to place before the shareholders a comprehensive, well-thought-out programme of development"

The fact that the North Borneo Company's charter involves the administration of the colony gives it a free hand, but for many years it was difficult to interest home capital in the country. Due, however, to continuous effort, ignoring discouragements and disappointments, the pioneers in North Borneo are slowly but surely securing not only handsome profits on investment but wide recognition of the rich undeveloped resources of the colony and the opportunities for returns on legitimate enterprise it offers.

PHILIPPINE TRADE EXPANSION

Statistics available for the first quarter of the fiscal year 1910-1911 ended September 30 indicate a total increase of exports to all countries of over 20% and a similar increase of exports to the United States over the corresponding period 1910-11, while the falling off in imports for the same period was not more than 900,000 or 8%, and the total volume but 12% on that from the United States.

The total of exports for the first quarter 1910-11 was $12,882,737 compared with $10,504.221 during the corresponding quarter 1909 10 while the imports were $11,393,547 and $12,204,981 for the same respective periods.

The totals of exports and imports were $24,276,286 in the quarter ended September 30, 1911, as against $22,209,202 for the corresponding quarter, 1910, or an increase of trade of $1,567,064. The exports to the United States for the quarter ended September 30, 1911, amounted to $7.330,561 as against $5,103,695 for the corresponding period, 1910, or an increase of $2.226,866, while the exports to foreign countries for the same quarter 1911 was $5.552,176 as against $5,400,526, an increase of $112,176.

On the other hand the total imports from all countries for the same quarter 1911 amounted to $11,393.549 as against $12,204,981 during the corresponding quarter, 1910, a falling off amounting to $811,332. Of this decrease the United States suffered to the value of $449,452 while foreign imports fell off $361,8[illegible]0.

The trade situation for the quarter shows the United States leading with $3.976,540 imports, $7,330,561 exports, total $11,307,101; the United Kingdom $1,189,410 imports, $1,31 ,817 exports; total $2,501,227; the French East Indies $2 406,753 imports, $3,009 exports, total $2,409,762; France, $242,625 imports, $1,769,550 exports, total $2,039.175; and Germany $548,191 imports, $478,328, exports, total $1,260,519.

A review of the above figures shows that while the United States during the quarter referred to in 1911 purchased Philippine products to the amount of $7.330 561, the value of American goods imported into the islands was only $3,976 540, while all other countries purchased during the quarter only $5,552,176 of Philippine products they sold goods to the island to the value of $7,316,009. These figures demonstrate that while reciprocity with the United States has increased the purchasing capacity of the Philippines, the American manufacturers seem satisfied that the greater volume of Philippine purchases should be made in Europe. Indeed, so far as trade with the islands is concerned, the benefits of reciprocity, which should naturally accrue to American manufacturers, have been in fact, in the larger sense, reaped by Europe. The Philippines at the present time serves as another avenue through which American money passes to swell the receipts of European manufacturers, and for the only reason that the American *manufacturers fail to realize* the possibilities of the Philippine market.

This is clearly demonstrated out by the following comparative tables covering the fiscal years 1909, 1910, 1911, and the first quarter of 1911-12.

Value in U. S. Currency of Exports to and Imports from the United States and other countries.

	1909	1910	1911	1st quarter Fiscal year 11-12
Total value of exports to United States	10,254,087	18,793,687	16,813,864	7,330,561
Total value of imports from the United States........	4,693,831	10,798,238	14,942,908	3,976,540
Total value of exports to other countries....	20,790,371	20,924,282	22,964,765	5,552,176
Total value of imports from other countries.........	23,100,651	26,269,392	30,014,881	7,316,009

Industrially the Philippines are in their infancy. The potentiality of the islands cannot be measured at this time. The opportunities for creative enterprises offering not the slightest competition to industries in continental America but that would enjoy the advantage of an established market are to be found on every hand. The increased export of the last few years is the result of the encouragement given by reciprocity with the United States. The methods employed, however, are so inefficient that but a small percentage of the benefits are reaped and the volume product minimized. With the introduction of capital and modern methods, there is no limit that may be set to industrial expansion and production.

A review of the history of American foreign trade points to ineffectual organization in its promotion. America purchases from countries without attempting to secure reciprocal return in markets for American goods.

As an example, there is a marked increase in the purchases of Philippine product in the United States over the exports to the islands. The Philippines, if developed along industrial lines, would produce almost every tropical product now imported into the United States from foreign countries. But before the Philippines may establish this claim, they must have capital and modern machinery. The more enterprises, the more machinery, and the greater the volume of reciprocal trade in which all American manufacturers could participate.

The failure of American manufacturers to realize the necessity of developing trade in the insular possessions, especially in the Philippines, seems nothing short of neglect. It is at the present stage of Philippine development as the country is entering an era of marked expansion that the foresighted capitalist and manufacturer should be on the alert.

The Philippine administration is working hand in glove with the commercial interests for the advancement of industry and commerce. Manila is searching the globe for a direct steamship line to Japan and a sixteen day service with San Francisco. We venture to say that no other country offers conditions conducive to successful investment in industrial enterprises more favorable than in the Philippines.

With the beginning of 1912 almost every commercial house found it necessary to increase its capital and otherwise expand to meet the rapidly growing trade. Capital is coming in slowly but surely. The whole commercial fabric is established on a firm basis. The future of the islands never appeared brighter, and all nationalities identified with insular interests look forward with confidence to even greater prosperity in 1912 that marked the year just closed.

THE FAR EASTERN ASSOCIATION OF TROPICAL MEDICINE

The program for the second biennial congress of the Far Eastern Association of Tropical Medicine to be held at Hongkong January 20-27 has been published. The congress will be held in the City Hall and an address of welcome given by H. E. the Governor. Dr. J. Mitford Atkinson, M. B., D. P. H., President of the Association, will follow with an address on "the Progress of Tropical Medicine during the past 25 years." Two sessions a day will be held and the following program carried out:

January 22nd.—"The substance in rice polishings which prevents Polyneuritis gallinarum and beri beri," Major Weston P. Chamberlain, M. D., and Captain Edward B. Vedder, M. D., Manila; "Beri Beri," C. Noel Davis, M. B., D. P. H., Shanghai; "Beri Beri," Victor G. Heiser, M. D., Manila; "Etiology, prophylaxis and treatment of Beri Beri," L. Breaudat, M. D., Saigon; "Beri Beri," A. Gaudacheau, M. D., Medecin Major, Hanoi; "Beri Beri," H. Fraser, M. D., D. P. H., Kuala Lumpor; "Beri Beri at Saigon," M. L. R. Montel, M. D., Saigon; "Beri Beri in Japan," Prof Y. Terauchi, M. D., Tokyo; "Beri Beri in a Prison in Korea," Prof. K. Shiga. M. D., Tokyo; "The Etiology of Beri Beri," Richard P. Strong, M. D., Ph. D., Manila.

January 23rd.—"Studies in the multiplication of Amoebae of the human intestine," A. Gaucheau, M. D., Hanoi; "An experimental study of the action of Ipecacuanha on Amoebae," Capt. Edward B. Vedder, M. D., Manila; "The treatment of tropical dysentery," K. Majima, M. D., Hongkong; "The surgical treatment of dysentery," O. Muller, M. D, Hongkong; "A contribution to the study of the bacteriological diagnosis of cholera," Prof. Terauchi, M. D., and O. Hida, M. D., Tokyo; "Tuberculosis in Macau," J. A. F. de Moraes Palha, M. D., Macau; 'A preliminary report on the source of the human liver Distome (Clonorchis endemicus-Balz)," H Kabayashi, M. D, Tokyo; "Intestinal parasites of man in Hongkong," J. Bell, M. R. C. S., D. P. H., Hongkong; "Immunization against Pneumonic Plague," Richard P. Strong, M. D., Ph. D., Manila; "Preventive inoculation in experimental plague-pneumonia," Prof. G. Shibiyama, M. D., Tokyo; "The connection between man and rat in the plague-epidemic in Malang, Java, during 1911," W. L. de Vogel, M. D., Batavia; "Surgical work in South China." H. Gordon Thompson, M. D., F. R. C. S, Pakhoi.

January 24th.—"The laboratory diagnosis of syphilis," C. Montague Heanley, M. D., D. P. H., Hongkong; "Researches into the supra-epitrochlear gland in cases of undiagnosed and denied syphilis," Dr. Lannelangue, Saigon; "General anesthesia by hypodermic and spinal injections," Dr. Hermants, Annam; "The care of the eye-sight in the tropics," G Montagu Harston, M D., Hongkong; "Carbon dioxide of snow—its use in private practice in the tropics," Gregory P. Jordan, M B., Hongkong; "Some remarks on the subject of vesical calculi in South China, with a report of more than one thousand cases," J. M. Swan, M. D., Canton; "Results of the past two years' work in the study of tropical sunlight," Paul C. Freer, M. D., Ph. D., Manila; "The relative resistance of blondes and brunettes to the harmful influences of a tropical climate," Major W. P. Chamberlain, M. D., Manila; "Opium Poisoning," C. Rangée, M. D., Hanoi; "Opium," A. Gauducheau. M. D., Hanoi.

January 25th.—"A Plea to the medical profession of the Far East and of the Tropic zone to systematically record and report their observations," J. R. McDill, M. D., Manila; "The need for physiological standards in clinical research," G. Duncan Whyte, M. B., Swatow; "The care of children in the tropics," G. Montagu Harston, M. D., Hongkong; "Infant feeding in the tropics, W. E. Musgrave, M. D., Manila; "The Prophylaxis of umbilical tetanus at Saigon, M. L. R. Montel, M. D., Saigon; "Latest researches into Spotted Fever," Dr. Fürth, Staff Surgeon, Tsingtau; "Relapsing Fever and its treatment by Salvarsan," W. V. M. Koch, M. D., C. M., Hongkong; "Milaria crystallina lebrilis (Ban Bach) (Miliary Fever)," Dr. Sarailhé, Bienhoa, Cochin China; "Blood, Pressure," J C. Dalmahoy Allen, M. D., Hongkong; "On the nature of the Marginal Point," M. Koidzumi, M. D., Tokyo.

January 26th.—"Malaria as a factor in the etiology of biliary calculi," G. A. Finlayson, M. A., M. B., M. R. C. P., Singapore; "Remarkable Parasites in a case of Tertian Malaria," Capt. H. M. Neeb, M. D., Batavia; "A demonstration of the anophellæ mosquitoes of India," Major S. P. James, M. D., D. P. H.; "The diagnosis of malarial fever in the absence of the parasites from the peripheral blood," K. Justi, M. D., Hongkong;" Blackwater fever in Burma," Lawrence G. Fink, M. D., Burma; "Mortality, birth-rate and sanitation of Saigon," M. L. R Montel, M. D., Saigon; "Town planning and sanitary conveniences at Tsingtau," Dr. Uthermann; "Indian native coolie immigration," Sir Allen Perry, M. D., D. P. H., Ceylon; "The necessity for uniform quarantine regulations for all the coast ports of China," Dr. Uthermann, Tsingtau.

January 27th is to be devoted to business matters.

THE PHILIPPINES, THE LAND OF THE PALM AND PINE

The above attractive title identifies an exhaustive guide book on the Philippines just issued by the Department of Commerce and Police from the presses of the Bureau of Printing plant. Typographically, the brochure is an almost a perfect production. The cover design and the decorative borders emphasize the impression made by evidence of high standard craftsmanship. Some objection might be raised to the lack of detail in the illustrations due to reduction of views in the photo-engraving process and the obscuration due to the shade of ink used, but, altogether, this is largely counter-balanced by color effect.

The production gives evidence of extended research and careful selection of information about the Philippines of especial interest covering the history of the islands, its government and what it is doing, tours and trips including the environs of Manila, short trips from the capital city, Baguio, attractions of Southern and Northern Luzon, Visayas, Palawan and Mindanao. Then follow five chapters on the resources and commerce of the Philippine Islands. All is appropriately illustrated with scenes of the Philippines and of the different features of Philippine life.

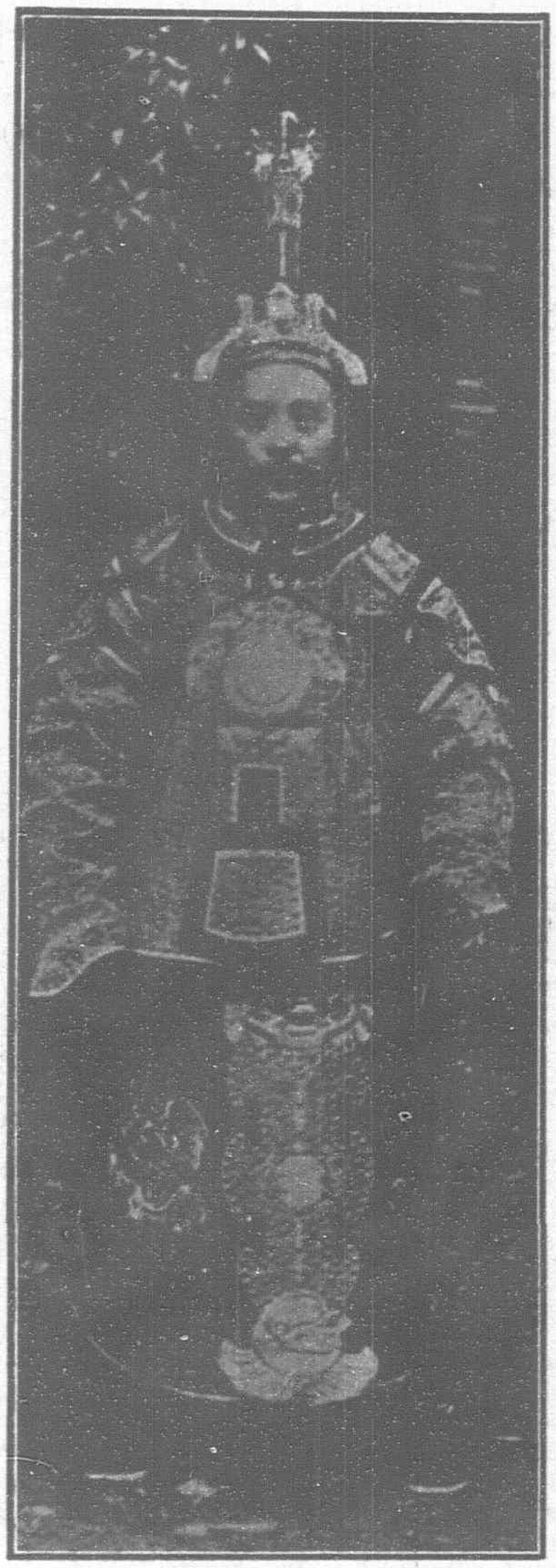
There are also nine appendices, giving a glossary of pronunciation of native names and words used in the text, a list of the principal hotels and churches in Manila, banks in the Philippines, points reached by the street car lines in Manila, legal fares for public carriages in Manila, list of the best books on the Philippines for the general reader, postal, telegraph, and cable rates, and a list giving names and locations of the districts into which Manila is divided.

With this volume for reference any stranger to the islands may acquire an intelligent knowledge of them. It will be made available at cost for distribution throughout the globe and arrangements are being made by local publicity interests to give it wide circulation.

The volume was prepared by John R. Arnold under the direction of Hon. Charles B. Elliott, Secretary of Commerce and Police of the Philippine Islands.

THE CHINESE SITUATION

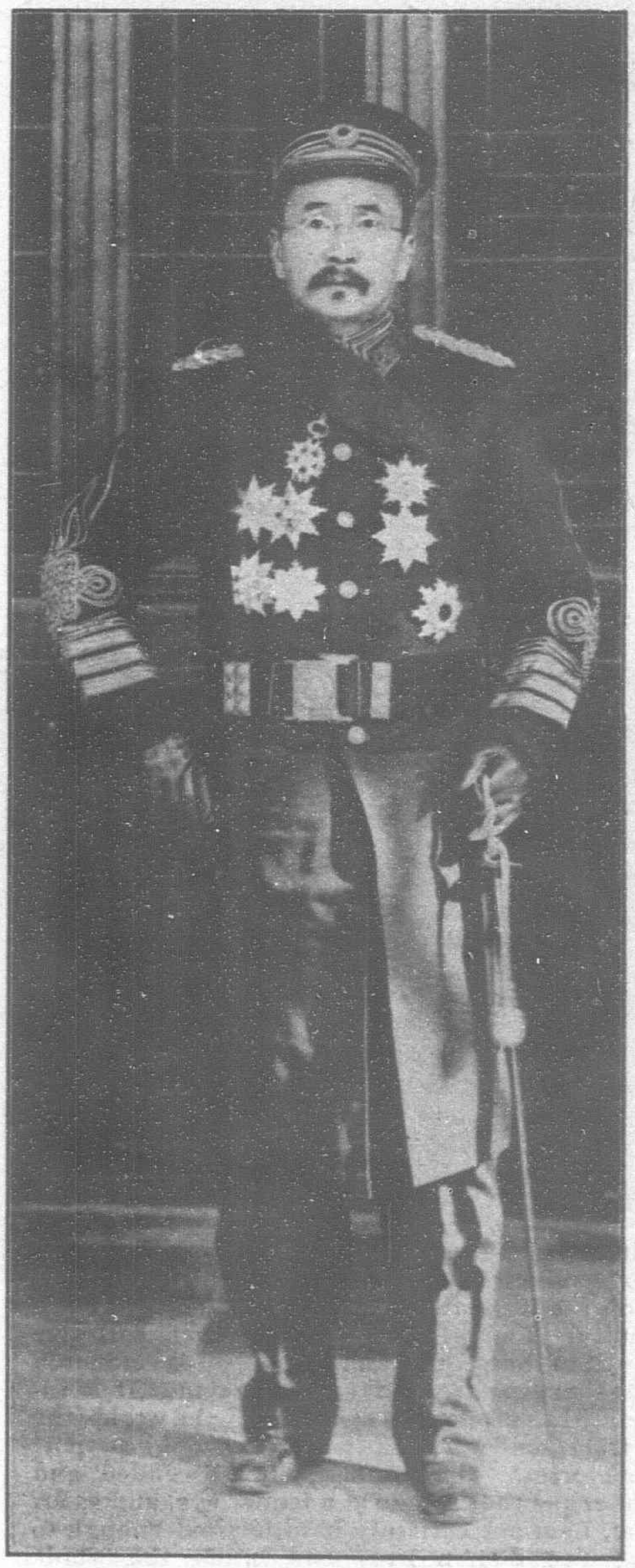
Dispatches from Peking announce the recent departure from Peking to Jehol of the Emperor and his court, all of the leading officials joining in the flight but Premier Yuan Shih Kai. Similar unauthenticated reports received from the capital previously lent some doubt as to their reliability until the receipt of the announcement from Shanghai that, following the report, an armistice had been promptly arranged and negotiations are to be continued leading to an adjustment of differences, the prompt establishment of a temporary government, and later a permanent form of government for the empire.



AN OLD PHOTO OF HIS EXCELLENCY, YUAN SHIH K'AI, IN NATIVE OFFICIAL DRESS

During the month, Chinese history in the making proceeded very unsatisfactorily. The peace conference in Shanghai opened with the arrival of Tang Shao Yi representing Premier Yuan, December 18. During the progress of the conference Dr. San Yet San added his presence and counsel to the revolutionary cause. On December 28, the following edict was issued from Peking:

"The Cabinet submits a telegraphic memorial on behalf of Tang Shao-yi, reporting that Wu Ting-fang, representative of the Republican Army, firmly asserts that the desire of the people aims at the establishment of a Republican form of Government as their object, etc. This time in respect of the Wuchang outbreak, the Throne has graciously granted the request of the Tszechengyuan, by the promulgation of a Constitutional Statute consisting of nineteen clauses to which an oath of adherence has been taken in Our Ancestral Temple, expecting at first an early cessation of hostilities and the enjoyment of the blessings of peace with our citizens. However, owing to incredulity in Our good faith, political strife has repeatedly arisen. In my opinion, the question which of the two forms, Monarchical Constitution or Republican Constitution, would better suit Our country to-day, is a truly vital one, affecting, as it does, both home and foreign interests—it is not a question that a single section of people may monopolize, nor can it be decided arbitrarily by the Throne alone. A Provisional Parliament should therefore be summoned to which the question should be handed for pubilc decision.



TANG SHAO-YI

IN MILITARY UNIFORM, AS GENERAL OF THE MUKDEN FORCES, WHILE GOVERNOR OF THE PROVINCE OF FENGTIEN

"In response to a request of the Ministers of State I have summoned an assembly of the princes and dukes nearly related to the Imperial Family for a conference, and have questioned them in person, but no dissentient words have been spoken. Let the Cabinet instantly telegraph this idea to Tang Shao-yi who shall retransmit it to the Republican Representative with a request that it be published forthwith.

"On the other hand, the Cabinet is to frame proper rules of election for adoption, in order to summon the Parliament within the shortest time, and consult carefully with Wu Ting-fang so that both sides may first cease from war, in order to tranquillize the masses and avert calamity. I am of opinion that Heaven will give birth to the people and then elect a monarch for them to shepherd (guide) them. It is intended that one man should feed the world (the nation), and not that the world should support one man. The Emperor has ascended and inherited the Throne at a tender age, and as for me, I am not certainly hard-hearted enough to sacrifice human lives and injure the whole nation. My only hope is that the Assembly will discuss and decide what is beneficial to the nation and helpful to the people. Heaven sees what the people see, and Heaven hears what the people hear. I wish my loving and patriotic soldiers and people, each imbued with the highest sense of justice, to join in their deliberation as to the adoption of the best policy (by the nation), for which I entertain the sincerest hope."

The edict was signed by the cabinet and was taken as an indication that no obstacle would be placed in the way of the convening of delegates to decide upon the form of government as proposed by the revolutionary delegates then attending the conference.

On December 30 a statement was given out by the conference to the effect that an agreement had been reached with respect to the convening of the National Convention to decide upon the future government and that it had been signed by Tang Shao Yi and Dr. Wu Ting Fang. The statement as published reads:

1. The National Convention shall be composed of representatives from the different "sections" of China. Each province shall form one section. Inner Mongolia and Outer Mongolia together shall form one section. Eastern Tibet and Western Tibet together shall form one section.

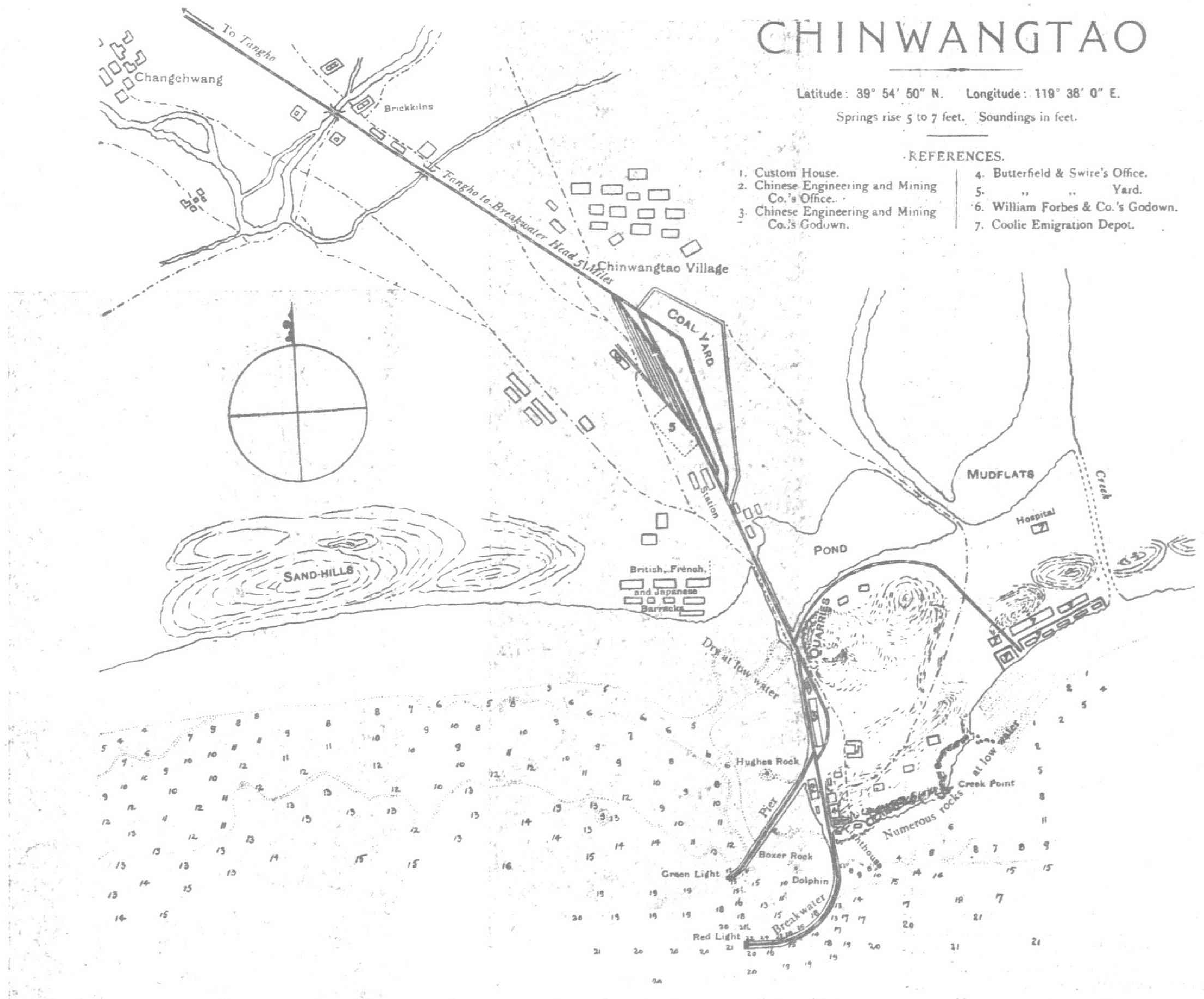
Each "section" shall be entitled to send three delegates and entitled to three votes but in the event of a lesser number from any "section" attending, such a section shall still be entitled to three votes.

2.—The delegates from the different "sections" shall be summoned by wire to the National Convention in the following manner, namely:—Those from Kiangsu, Amhi, Kiungsi, Hupeh, Hunan, Shansi, Shensi, Chekiang, Fukien, Kwangtung, Kwangsi, Szechuen, Yunnan and Kwe chow in the name of the Provisional Republican Government: those from Chihli, Fengtien, Kirin, Heilungkiang, Kansu, Chinese Turkestan, Shantung and Henan, in the name of the Manchu Government; and in addition to this, the Provincial Assemblies of these eight "sections" to be notified by wire in the name of the Provisional Republican Government; and those from Mongolia and Tibet, separately in the names of both the Manchu and the Provisional Republican Governments.

3.—When the delegates present represent three-fourths of the "sections," they shall be considered a quorum and may meet for discussion.

Matters were at this stage when a telegram was received from Premier Yuan announcing that Tang Shao Yi had not been authorized to conclude any agreement and that his sole duty was confined to discussion of the situation and to make recommendations to his chief. Meanwhile Tang Shao Yi tendered his resignation which was accepted. Then followed a series of telegrams between Premier Yuan and Wu Ting-fang.

In the meantime the revolutionary leaders proceeded on January 1, 1912, to organize a Provisional Government to have headquarters at


CHINWANGTAO
Latitude: 39° 54′ 50″ N. Longitude: 119° 38′ 0″ E.
Springs rise 5 to 7 feet. Soundings in feet.
REFERENCES.
1. Custom House.
2. Chinese Engineering and Mining Co.'s Office.
3. Chinese Engineering and Mining Co.'s Godown.
4. Butterfield & Swire's Office.
5. ,, ,, Yard.
6. William Forbes & Co.'s Godown.
7. Coolie Emigration Depot.
To Tangho
Changchwang
Brickkilns
Tangho to Breakwater Head 5¼ Miles
Chinwangtao Village
COAL YARD
Station
MUDFLATS
Creek
Hospital
POND
SAND-HILLS
British, French, and Japanese Barracks
QUARRIES
Dry at low water
Hughes Rock
Pier
Boxer Rock
Green Light
Dolphin
Red Light
Breakwater
Lighthouse
Numerous rocks at low water
Creek Point

THE PORT OF CHINGWANGTAO WHERE THE FOREIGN TROOPS WERE LANDED TO KEEP COMMUNICATION OPEN FROM PEKIN TO THE SEA.

Nanking. Dr. San Yet Sen was elected President and announced his cabinet as follows:

(1) Minister of War: Huang Hsun; and Vice-Minister, Tsiang Tso-ping.

(2) Minister of Marine: Huang Chung-yin; and Vice-Minister, Tang Hsiang-ming.

H. E. WU TING-FANG

MINISTER OF JUSTICE FOR THE PROVISIONAL REPUBLIC OF CHINA AND IN CHARGE OF PEACE NEGOTIATIONS WITH PEKING

(3) Minister of Justice: Wu Ting-fang; and Vice-Minister, L'yu Chi-yi.

(4) Minister of Finance: Chên Ching‘tao; and Vice-Minister, Wang Hung-you.

(5) Minister of Foreign Affairs: Wang Ch'ung-huei, and Vice-Minister, Wei Chung-tsu.

(6) Minister of Home Affairs: Chên Têh-chuan; and Vice-Minister, Chen Chêng.

(7) Minister of Education: Tsai Yuan-pei; and Vice-Minister, Chin Yao-yuih.

(8) Minister of Industry: Chang Ch'ien; and Vice-Minister, Ma Ghuenwu.

(9) Minister of Communications: Tang Shou-chien; and Vice-Minister, Yu You-jen.

General Hsu Shao-cheng is being proposed to fill the post of Chief Military Councillor.

A manifesto was then issued ou January 5 to the foreign powers as follows:

Greeting—The hitherto irremediable suppression of the individual qualities and national aspirations of the people having arrested the intellectual, the moral, and the material development of China, the aid of revolution has been invoked to extirpate the primary cause, and we now proclaim the resultant overthrow of the despotic sway wielded by the Manchu Dynasty and the establishment of a Republic.

The substitution of a Republic for a Monarchical form of Government is not the fruit of a transient passion. It is the natural outcome of a long cherished desire for broad-based freedom making for permanent contentment and uninterrupted advancement. It is the formal declaration of the will of the Chinese nation.

We, the Chinese people, are peaceful and law abiding. We have waged no war except in self-defense. We have borne our grievances during 267 years of Manchu misrule with patience and forbearance. We have by peaceful means endeavored to redress our wrongs, secure our liberty, and ensure our progress, but we have failed. Oppressed beyond human endurance we deemed it our inalienable right as our sacred duty to appeal to arms to deliver ourselves and our posterity from the yoke to which we have so long been subjected, and for the first time in our history inglorious bondage has been transformed to an inspiring freedom splendid with the lustrous light of opportunity.

The policy of the Manchu dynasty has been one of unequivocal seclusion and unyielding tyranny. Beneath it we have bitterly suffered, and we now submit to the free peoples of the world the reasons justifying the revolution and the inauguration of our present government.

Prior to the usurpation of the Throne by the Manchus, the land was open to foreign intercourse and religious tolerance existed, as is evidenced by the writings of Marco Polo and the inscription on the Nestorian tablet of Sianfu.

Dominated by ignorance and selfishness the Manchus closed the land to the outer world and plunged the Chinese people into a state of benighted mentality calculated to operate inversely to their natural talents and capabilities, thus committing a crime against humanity and the civilized nations almost impossible of expiation.

Actuated by a desire for the perpetual subjugation of the Chinese, by a vicious craving for aggrandisement and wealth, the Manchus governed the country to the lasting injury and detriment of our people, creating privileges and monopolies and erecting about themselves barriers of exclusion in national custom and personal conduct which have been rigorously maintained throughout the centuries.

They have levied irregular and unwholesome taxes upon us without our consent, have restricted foreign trade to treaty ports, placed likin embargoes upon merchandise in transit; and obstructed internal commerce.

They have retarded the creation of industrial enterprises, rendered impossible the development of natural resources, and wilfully neglected to safeguard vested interests.

They have denied us a regular system and impartial administration of justice, inflicted unusual and cruel punishments upon all persons charged with offences whether innocent or guilty; and frequently encroached upon sacred rights without due process of law.

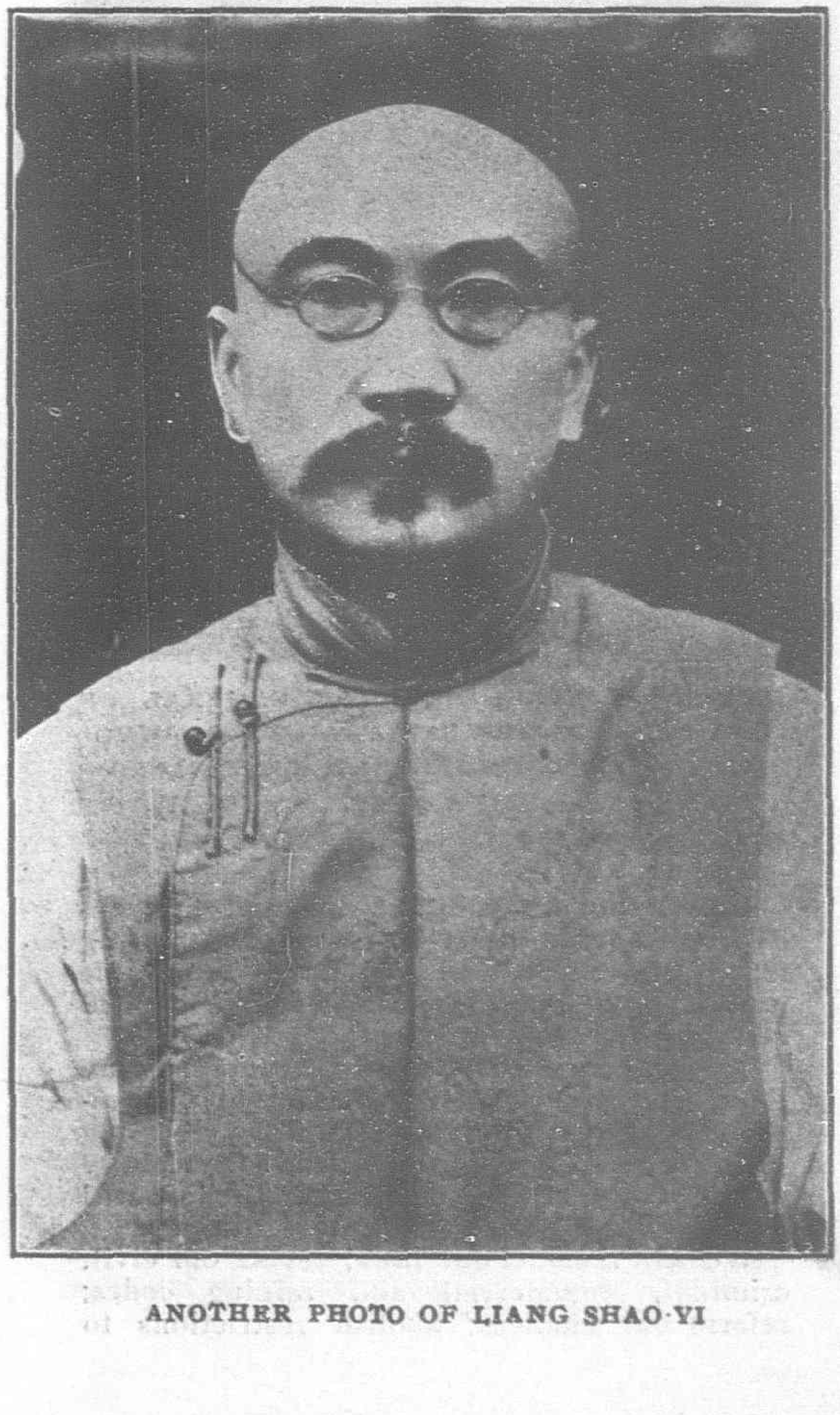
They have connived at official corruption; sold offices to the highest bidder; and subordinated merit to influence.

They have repeatedly rejected our most reasonable demands for better government, and have reluctantly conceded pseudo-reforms under most urgent pressure, making promises without intention of fulfilling them; and obstructing efforts towards national elevation.

They have failed to appreciate the anguishing lessons taught by the foreign Powers in the process of years, and have brought themselves and our people beneath the contempt of the world.

To remedy these evils and render possible the entrance of China to the family of nations we have fought and formed our government, and lest our good intentions should be misunderstood we now publicly and unreservedly declare the following to be our promise:

All treaties entered into by the Manchu Government before the date of the Revolution will be continually effective up to the time of their termination; but any and all entered into after the commencement of the Revolution will be repudiated.



ANOTHER PHOTO OF LIANG SHAO-YI

All foreign loans or indemnities incurred by the Manchu Government before the Revolution will be acknowledged without any alteration of terms; but all payments made to, and loans incurred by, the Manchu Government after the commencement of the Revolution will be repudiated.

All concessions granted to foreign nations or their nationals by the Manchu Government before the Revolution will be respected, but any and all granted after the commencement of the Revolution will be repudiated.

All persons and property of any foreign nation within the jurisdiction of the Republic of China will be respected and protected.

H. E. TUAN FANG, DIRECTOR GENERAL OF THE IMPERIAL HUKUANG RAILWAYS—WHO WAS REPORTED MURDERED BUT ESCAPED BY A RUSE.

It will be our constant aim and firm endeavor to build upon a stable and enduring foundation a national structure compatible with the potentialities of our long-neglected country.

We will strive to elevate our people; secure them in peace, and legislate for their prosperity.

To those Manchus who abide peacefully within the limits of our jurisdiction we will accord equality and give protection.

We will remodel our laws; revise our civil, criminal, commercial and mining codes; reform our finances; abolish restrictions to trade and commerce, and ensure religious toleration.

The cultivation of better relations with foreign peoples and governments will ever be before us. It is our earnest hope that the foreign nations who have been steadfast in sympathy will bind more firmly the bonds of friendship, that they will bear in patience with us the period of trial confronting us in our reconstructive work, and that they will aid us in the consummation of the far-reaching plans which we are now about to undertake, and which they have so long and so vainly been urging upon the people of this our country.

With this message of peace and goodwill the Republic of China cherishes the hope of being admitted into the family of nations not merely to share their rights and privileges, but also to co-operate with them in the great and noble task called for in the upbuilding of the civilization of the world.

(Signed) SUN YAT-SEN President.

(Countersigned) Minister for Foreign Affairs.

Dated at Nanking Fifth day of the first month of the first year of the Republic of China (Jan. 5, 1912.)

On the date of the manifesto, a telegram was received from Premier Yuan by Dr. Yu Ting Fang calling attention to the fact that it had been decided to leave the question of form of government to the decision of a national convention and ignoring this the revolutionaries had proceeded to form a republican government at Nanking. He called on Dr. Wu to explain and apologize.

There appears to have been further telegrams between Dr. Wu and Premier Yuan, but the situation remains more or less vague. Apparently an agreement was reached to hold a national convention to discuss the form of government, but from what can be gathered neither side seems willing to pledge definitely to abide by the convention's decision so that up to January 10 a deadlock might express the situation.

News from other points are to the effect that the selection of delegates is being made in compliance with the terms of the agreement signed by Tang Shao Yi, preparatory no doubt to probable understanding as to the form and powers of the convention.

During this interval fighting has been reported in Luanchow. Foreign troops have proceeded to Chingwantao to guard railway communication from Peking to the sea. This action is without significance beyond the purpose of the powers to protect the railway and is in conformity with treaty rights. The neutral attitude of the powers emphasized since the beginning of the present struggle will continue. Reports of threatened attacks on Peking are of daily circulation to be refuted later.

There is evidence of purpose on the parties on either side to avoid further bloodshed and there is no doubt but that democracy has triumphed whether a republic or a limited form of monarchical government is finally established.

The report that Tuan Fang had been assassinated by his soldiers in Szechuan has been disproved by the sudden appearance of Tuan who was responsible for the rumor in order to make his escape in disguise from his mutinous followers. He bribed soldiers to kill a pig, display bloody swords and announce his death.

The prospects for early peace improved the Shanghai market somewhat the first week of the new year. Very little new business is reported but cargo covering ante-revolution orders were cleared.

Money appears plentiful in Shanghai due, largely to the large silver shipments from the interior.

REDWOOD FOR RAILWAY SLEEPERS

According to a report of the maintenance of way officials of the Southern Pacific lines west of El Paso that system has in its roadbed to-day 25,250,000 crossties. They consist of pine, fir, oak, cedar and redwood, all of which, except redwood ties, are either burnettized or creosoted before being used, in order to prolong their durability. Redwood is found to be a naturally long-lived wood.

The burnettizing process consists in forcing chloride of zinc into the wood cells. A vacuum treatment is first applied. The ties are placed in a cylinder, steamed for the purpose of softening the wood cells, then the vacuum is applied to extract the sap and water from the wood. After this the chloride of zinc is applied. More than half a day is required for this process, after which the ties are treated to a sun bath for several weeks. The creosoting process is essentially similar to burnettizing, except that dead oil of coal tar is used in place of the zinc solution.

There are four spikes in each tie and two tie-plates. This means, therefore, 101,000,000 spikes and 50,900,000 tie-plates in the Pacific system of the Southern Pacific. The tie-plates weigh six and one-half pounds each, the spike a half pound, making a total of 681,950,000 pounds of metal attached to these ties, not counting of course the rails, which weigh ninety pounds to the yard, and the numerous tie rods.

One-seventh of the ties are renewed annually. This means new ties for 240 miles of road every twelve months. During the last ten years, 20,098,490 ties were taken up and replaced with new ones.

REVIEWS

History of Bridge Engineering, by Henry Grattan Tyrrell, C. E. Cloth, $4.00 net.

This volume contains a condensed review of bridge building from the earliest history of Egyptian architecture to the present time and should place the student and designer in touch with the history of this branch of engineering construction. The work is freely illustrated. It will be welcomed in any designer's reference library, especially in the selection of economic types and the preparation of comparative designs and estimates.

Treatise on the Design and Construction of Mill Buildings and Other Industrial Plants, by Henry Grattan Tyrrell, C. E. Cloth, $4.00 net. The Myron C. Clark Publishing Co., Chicago and New York.

The work is based mainly on the personal experience of the author, covering a period of twenty years in designing and estimating building, bridges, and other structural work. The *Engineering News* says of this work:

"Mr. Tyrrell has produced not only a new book, but one that affords by far the largest and best collection of practical information on Mill Buildings yet published. * *

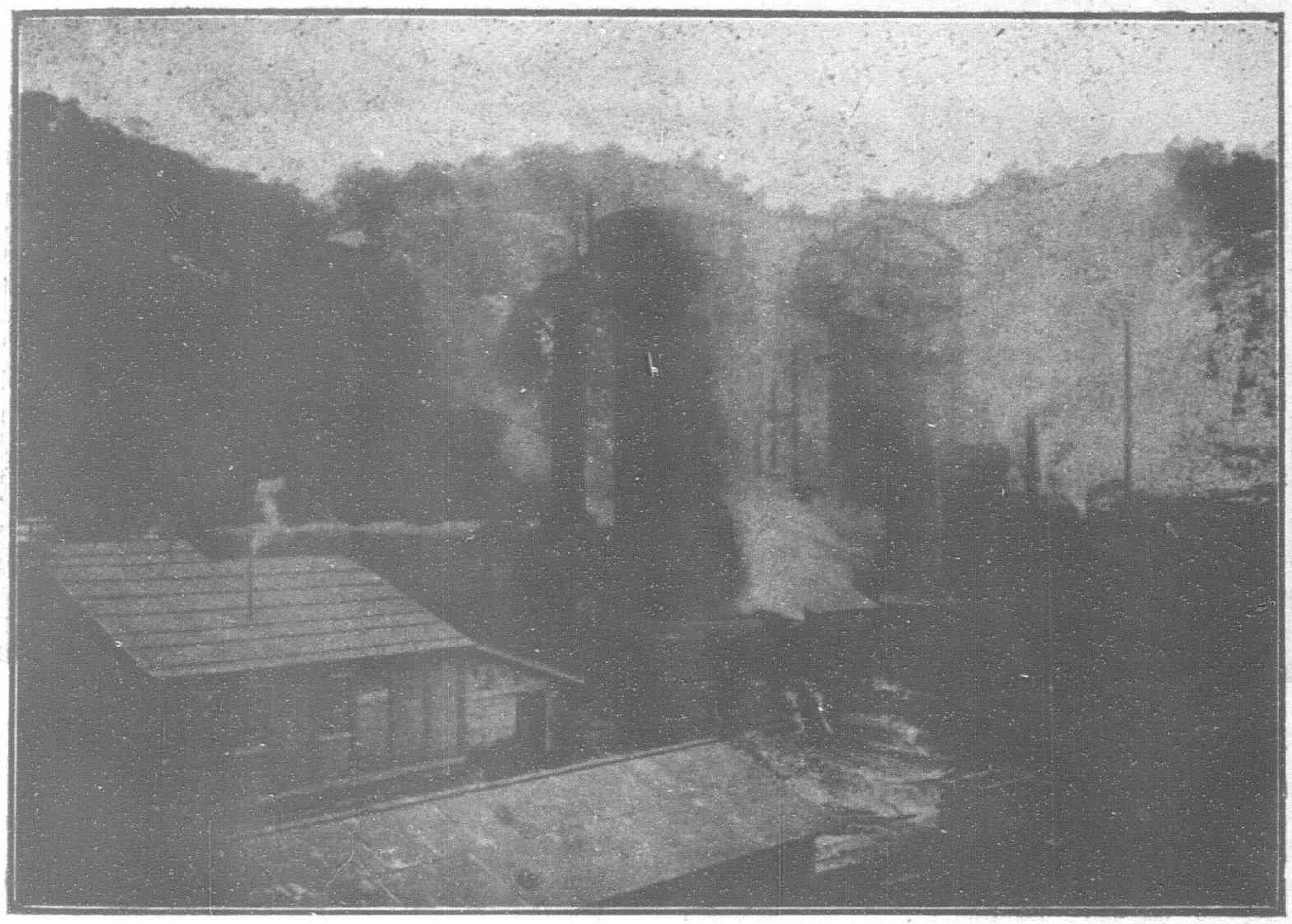
"The book before us gains in value by devoting itself wholly to general arrangement, construction details, and working data."

A Naturalist on Desert Islands, by Percy R. Lowe, B. A., M. B., issued from the presses of Messrs. Wetherby & Co., London, has reached our desk and is introduced by the author as no "Book on Travels" nor "Useful Information" but deals with "Desert Islands" for the sake of what they are in themselves, and for the sake of what they contain of beast and bird, of rocks, of sea-flowers and coral gardens."

The whole reflects impressions gathered by the author and party on yachting cruises in the Carribean Sea and the Gulf of Mexico during six consecutive winter seasons visiting almost every island large and small in those two basins besides some of the coasts of Venezuela, Mexico and Florida. The volume contains sketch maps and is illustrated throughout with views of points visited; results of fishing excursions, and of ornithological subjects collected, etc. This book will be of interest to the naturalist. The general reader may be led to regret that the cruises referred to had not been indulged at a period when the Bucanneers were active in that zone.

KAMAISHI IRON AND STEEL WORKS

General description.—Kamaishi harbor is situated on the eastern coast of the province of Rikuchu, about 340 miles north of Yokohama. At the head of the harbor, where the Kamaishi Iron and Steel Works are located there are blast furnaces. steel plant, pipe casting foundry, etc. Some 10 miles in the interior is the Obashi ore station whence iron ore and limestone are carried down to the Kamaishi works on a horse tramway of 30 inches gauge. A rapid increase of traffic necessitated the building of railroads and the substitution of locomotives for horses. The branch works at Kurihashi are located a distance of about 16 miles from the Kamaishi main works. While the furnaces of the Kamaishi works are supplied with iron ore from several outcrops in the Obashi mine, that of the Kurihashi works is smelting ore from Aonoki and Takamai outcrops Coal is brought from collieries in Hokkaido, Kyushu, and recently from the Kaippin coal mine in China. Fuel for the Kurihashi furnace is geographically limited to charcoal prepared from wood in the neighbouring districts.



THE KAMAISHI SMELTERS

The receipt of coal and shipment of pig iron, steel products, and so on are greatly facilitated by a wharf, 820 feet long and 36 feet wide, projecting into the harbor, which is deep enough to provide anchorage alongside for steamers up to 3000 tons. The distance between the works and wharf is about one mile, and they are connected by railroads on which locomotives are running all the time. The company has five steamers of a total tonnage of 5802 tons.

The total number of workmen in the works and mines was in 1908 estimated as 6473. Most of them are living in houses provided rent free. There are also shops, hospitals, schools, and boarding-houses for the accommodation of officials and workmen.

The production during the last five years is shown on the following table:

	Pig iron, tons.	Spiegeleisen and ferro-manganese tons.	Steel, tons.	Cast iron pipe tons.	Copper, lbs.
1904	26,438	569	4.611	372	
1905	37,255	4,346	4,163	723	
1906	29,651	4,195	3,963	4,183	
1907	30,497	4,025	3,675	4,912	57,788
1908	34,418	789	3,657	12,788	109,344

During last year, the rolling mills and engines were perfected and the copper furnace worked at its full capacity. Therefore when the statistics for the year 1909 are made up, the total production of steel and copper will greatly surpass that of preceding years.

Short History.—The old notarial records show that the existence of iron ore was first known in 1823, being discovered by a hunter at Obashi village; but the actual smelting of it is traced to about 1849, when a Nakano or Rikuchu and a Takashu of Mikawa province erected furnaces in the vicinity of Obashi. For long succeeding years, the iron industry was carried out under the control of the Nanbu family, the feudal lord of the province. In the beginning of the Meiji period, Count Nanbu ordered Mr. Takato Oshima (the father of Dr. Oshima, the late chief engineer of the Japanese Imperial Steel Works at Wakamatsu) to improve the method of smelting iron ore after the European system. He erected two blast furnaces working, with cold blast and using charcoal. In 1873. the late Mr. Zenyemon Ono, a rich merchant of Morioka city purchased the Obaashi mines and built two small furnaces at Obashi. Prior to this the Japanese Government had encouraged several branches of industry and their attention was turned also to the iron industry. In 1874, the government decided to undertake it themselves. They bought up the Obashi mines and fixed the seat of the works at Kamaishi where the present works are. A railway was constructed from the Obashi mine to the works; two blast furnaces were designed; wrought iron furnaces and rolling mills were erected with all necessary equipments. It is said, the expenditure of money amounted to two million yen. In 1882, all works were completed and began to operate. But it was soon found that the furnaces never worked well and that the enterprise itself showed no promising aspect. Thus the works were entirely abandoned in the following year.

It was in 1885 that Mr. Chobei Tanaka secured the mines and properties from the government. At first, he erected two small charcoal blast furnaces designed by Mr. Kyutaro Yokoyama, the present manager of the works. On account of lack of technical knowledge, Mr. Yokoyama met at the start with several failures and a good many difficulties, but at last he succeeded. Through his strenuous life of twenty five years, the works were year after year extended; several scattered deposits of ore were bought up under one head; the number of furnaces increased, a steel plant and pipe casting foundry were initiated; much machinery was set up and modernized; in a word, the works have grown to the present state of prosperity. During the Russo-Japanese war, the mines supplied all products to the government arsenals which we believe proved of great service in the war.

General features of the mine district and geological distribution of ore deposit.—Nearly in the center of the district is Mount Kataba, about 4000 ft. above sea level, on both sides of which are found two groups of ore bodies. The southwestern group, called Obashi-group, extends about 16,000 ft. in the direction of 30° N.W., and the northeastern group, called Hashino group, is nearly 12,000 ft. long running from south to north. In the former group are seven large outcrops, Daisen, Yuoyama, Shinyama, Motoyama, Sahinai, Akaiwa and Aonoki, all of which are being worked. This group is the main ore resource of the Kamaishi Mine. In the Hashino group, there are numerous outcrops; but many of them are comparatively small, and the largest one only, Takamai, is being worked at present. These outcrops are all on the slope of the range of Mt. Kataba, situated as high as from 1600 ft. to 3300 ft. above sea level.

The chief rocks found on the district are paleozoic slate, limestone, garnet, porphyrite, diorite and granite; the last greatly predominates, occupying almost three-quarters of the area of the district. It is believed that the district consisted originally of paleozoic slate and limestone, then there arose an eruption of granite and diorite, and afterward ore bodies were formed metasomatically at the contact line of these two different formations of rocks. Through high heat and pressure of the mineral springs or gas, the limestone was dissolved in many places, and consequently there was a formation chiefly of garnet as well as other contact minerals. This is the reason why the ore bodies are almost always accompanied by a greater or less amount of garnet.

In the Obashi group, outcrops are almost successively continued. The thickness is so great as to measure from 30 ft to 60 ft., and sometimes more. For instance, it exceeds 300 ft. at Sahinai: thus forming a large renticular range of orebodies. In the Hashino group, the thickness of orebodies is generally far less than that of the Obashi, 50 ft. at Takamai being the largest.

The ore is all magnetite. It is generally hard and compact except at Aonoki where it is brittle and often falls down into powder by weathering. It is very pure at some outcrops such as Sahinai, Akaiwa and Takamai, and more or less impure at others, containing sulphidic minerals such as pyrites, pyrotites or copper-pyrites. In Yuoyama such sulphides agregate in large masses, and they are worked for the smelting of copper. The following is and average analysis of ores from different outcrops:

	Shinyama.	Sahinai.	Akaiwa.	Daisenzan.	Aonoki.	Takamai.
SiO_2	4.64	17.68	8.16	3.98	5.28	5.02
Fe	65.10	38.85	58.60	64.52	62.68	61.77
Cu	0.25	0.01	0.06	0.05	0.24	0.01
Mn	0.19	0.31	0.19	Not determined.	Not determined.	Not determined.
Al_2O_3	1.16	3.25	1.62	1.08	1.50	2.27
CaO	3.89	21.00	7.66	2.19	1.86	2.30
MgO	0.09	0.12	0.21	Not determined.	Not determined.	Not determined.
S	1.41	0.16	0.27	0.07	1.22	0.02
P	0.04	0.05	0.03	0.04	0 04	0.04

Mining.—"Open works" is adopted except at Shinyama and Aonoki, where the ore suitable for surface working has been nearly exhausted. The method of open work is stoping. The vertical distance of stopes varies from 12 ft. to 20 ft. according to the condition of the outcrops. At Shinyama, there are three main underground levels. The first level is working the orebody directly from its outcrop in both directions north and south. The second and third level are driven from the hill side to the ore deposit, as cross cuts, and from the place where they meet the deposit, proceeding both ways, north and south. The vertical intervals of levels are each 50 ft. At Aonoki, only one level is worked at present. As the thickness of orebodies is great, they are worked generally by the pillar system, as seen often in coal mines.

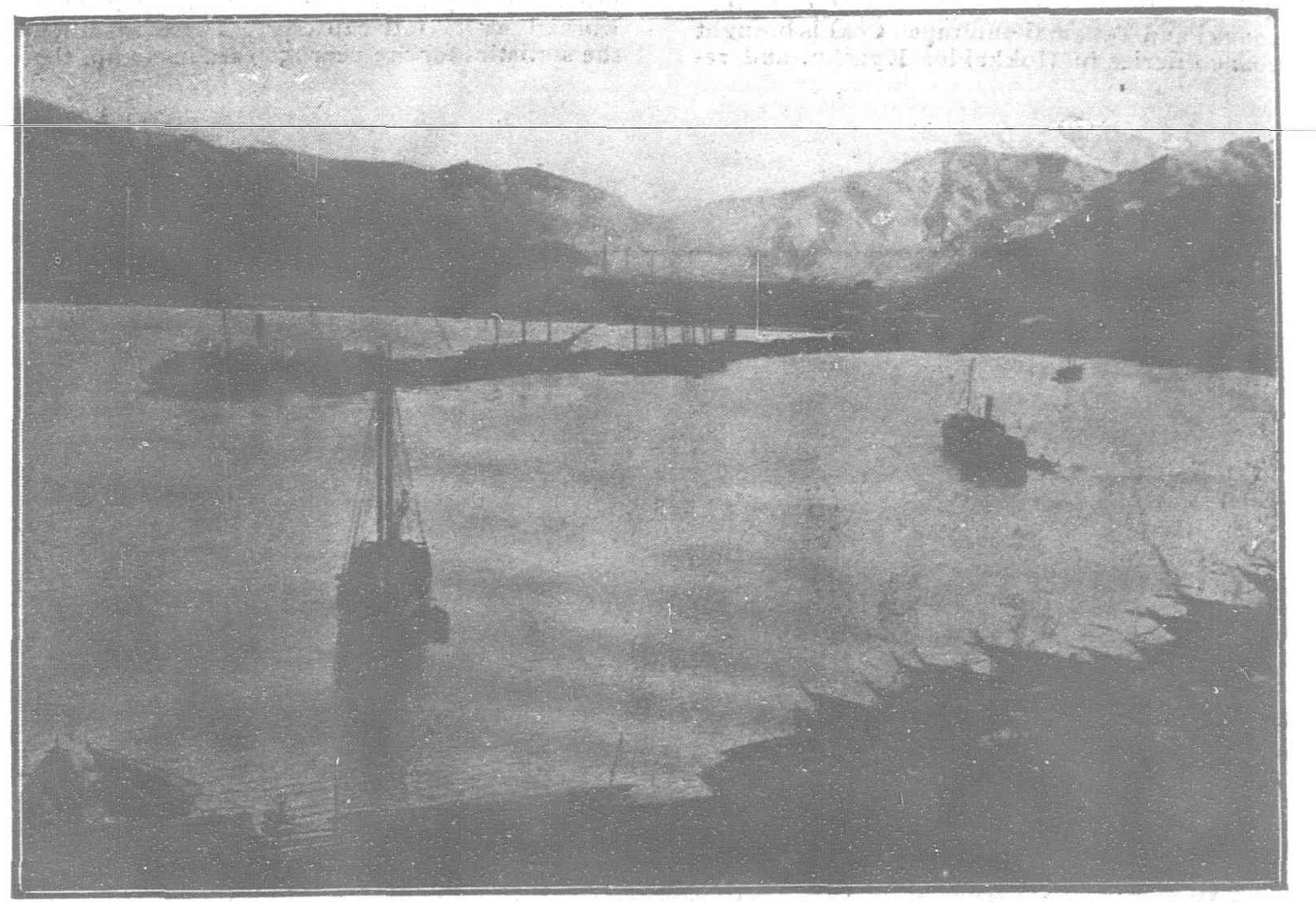
Transportation—The working places of Sahinai, Motoyama, Shinyama, and Yuoyama are connected with Obashi ore station by a main railway line. The gauge of the track is 25 inches and 18 lb. rails are used. The capacity of the ore cars is 23 tons. As Sahinai is situated on the north side of the mountain beyond a peak rising between Sahinai and Motoyama, these two places are connected by a tunnel 360 yards long, through which the main railway runs. The ore of Akaiwa outcrop, which lies far below Sahinai, is carried by a wire tramway passing over Sahinai peak, to Ganidake station where it is transferred to the main railway line. Another wire tramway and a branch line of track connect Daisen and Obashi ore station. The main railway is not a single continuous line. It consists of several short lines running across hill sides, and these are connected with self-acting inclined railways. There are six self-acting inclines, the longest 970 ft. and the shortest 180 ft., inclination varying from 38° to 28°. At every incline, ore cars are carried on to the incline cages at the upper end and are transferred directly to the track at the bottom, so as there is no trouble of unloading.

At Obashi ore station, the ore is reloaded into larger cars whose capacity is each 4 tons, and carried down to Kamaishi smelting works distant 10 miles 46 chains, by a horse tramway. The gauge of the track of the tramway is 30 inches, and 20 lb. rails are used. The ore of Aonoki and Takamai is carried by tubs running on a 25" track with 18 lb. rails, down to Kurihashi branch works.

Blast Furnace Department.—There are eight blast furnaces in all, seven located in the Kamaishi main works, and one in the branch works at Kurihashi. The latter was particularly designed to produce charcoal pig iron, and the former coke pig iron or ferro-alloys. As will be shown, each furnace is considerably limited in its producing capacity, say 10, 25, 60 tons per day. This is due to a policy of gradual development, starting from furnaces producing two or three tons per day, and for the reason that Japanese coke being soft and brittle in nature, can hardly stand the pressure of heavy burdens in a high and large furnace. Each furnace is provided with a set of calcining kilns in which magnetic ore is roasted to make it more porous and then more reducible, and to eliminate some sulphur contained in it.

The details of the construction of the blast furnaces are summarized on the following table:

Blast furnace.	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8
Position.	Kamaishi	,,	,,	,,	,,	,,	Kurihashi	Kamaishi
Kind of products.	Foundry pig iron.	,,	,,	,,	ferro-manganese	Foundry pig iron	,,	Spiegel-eisen
Kind of fuel.	Coke	,,	,,	Charcoal and Coke	Coke	Charcoal and Coke	Charcoal	Coke
Height, ft.	60′	60′	75′	40′	49′	40′	40′	49′
Inside dia. at the widest part, ft.	13′2	,,	16′5	9′2	11′5	9′2	9′5	11′0
Number of twyers.	4	,,	6	3	3	3	3	4
Dia. of twyers, inch.	3″½	,,	8″⅞	3″⅜	,,	,,	,,	,,
Pressure of blast, lbs. per sqr. inch.	4½	,,	6½	2¾	,,	,,	,,	,,
Temperature of air at twyers in Centigrade.	450°-500°	,,	500°-600°	380°-400°	500°-55°	380°-400°	,,	400°-450°



KAMAISHI HARBOR

HOT STOVES

Blast furnace.	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8
Number.	3	,,	,,	,,	,,	,,	,,	,,
Height, ft.	27′8	25′0	66′3	26′8	30′6	26′8	26′8	36′6
Inside dia, ft.	17′4	18′0	18′6	14′5	14′9	14′8	14′8	14′9
Heating surface, sq. ft.	6200	4500	2500	1600	1800	1600	1600	1800

There are 181 coke ovens of the retort type and 30 ovens of the bee-hive. To get proper composition, several kinds of coal are mixed, and after being thoroughly crushed in disintegrators, charged into ovens without washing. The composition of the coke manufactured average in 18% ash, 3% hydro-carbon, 1,3% sulphur and 0,04% phosphorus. The consumption of fuel for one ton of pig iron produced is 1,6 ton in coke furnaces and 1,5 ton in charcoal furnaces. Ferro-manganese and spiegel-eisen are manufactured from manganese ore of Kuji in Rikuchu and of Fukaura in Mutsu province, the metallic content of which amounts to 40%—55%, with the consumption of 3,5 tons of coke for one ton of 75% ferro-manganese and 2 tons for 15% or 20% spiegel-eisen. The use of limestone varies betwen 10% and 30% of the iron ore charged, according to the composition of slag desired. Pig iron is tapped at intervals of four hours into sand beds, but ferro-manganese as often as eight times a day.

Brick making forms an important department in connection with blast furnace linings. Fire bricks of several kinds are all manufactured in our own factory. From a few years ago silica bricks have been made from ganister rocks found in this district. Clays are brought from clay lands owned by us in Iwaki province, and partly purchased from owners at Kuji, of Rikuchu province. The success in blast furnace working is due to these excellent clays.

THE ANALYSIS OF PIG IRON AND OTHERS:

	Charcoal No.1 %	Charcoal No.2 %	Charcoal No.3 %	Coke No.1 %	Coke No.2 %	Coke No.3 %
Graphite carbon.	2,46	1,88	1,21	2,85	2,24	1.36
Combined carbon....	0,74	1,05	1,52	0,62	0,84	1,47
Silicon..	2,18	1,42	1,02	2,82	1,86	1,06
Phosphorus.	0,13	0,12	0,11	0,13	0,13	0,12
Sulphur.	0,02	0,05	0,08	0,03	0,06	0,12
Copper..	0,25	0,28	0,32	0,25	0,31	0,33
Manganese.	0,35	0,34	0,31	0,40	0,33	0,32

	Ferro-manganese No. 1	Ferro-manganese No. 2	Spiegel-eisen No. 1	Spiegel-eisen No. 2
Combined carbon....	7,85	6,82	4,98	4,10
Silicon.......	0,38	0,42	1,12	1,55
Phosphorus.	0,38	0,31	0,24	0,18
Sulphur.....	trace	trace	0,01	0,02
Copper......	0,10	0,12	0,18	0,22
Manganese .	75,58	50,43	20,30	10,35

Steel Department.—The building of the present steel plant is that in which wrought iron furnaces and rolling mills were formerly erected under the government management. In 1902, the old furnaces and machinery were all discarded and the company installed two open-hearth furnaces of Siemens-Martin type worked in basic, each producing five tons per heat which was afterwards enlarged, one to seven and another to ten tons. There are now two sets of 18 and 22 inches rolling mills of three high system, both attached to a triple expansion

(Continued to page 267)

PHILIPPINE MINING NEWS

Ameari River Placers.—During the month a new and promising placer gold district has attracted attention in mining circles as the result of a favorable report made by H. Park, a prominent Australian mining engineer of Sydney who represents the Ameari Option Co. Ltd. of that city. The group of claims are owned by a group of businessmen of Manila represented by Messrs. Squires, Bingham & Co., and the negotiations were carried on through Messrs. Johnson & Hartmen, two Australians who have been looking over the Philippine field.

The tests upon which Engineer Park made his report averaged 32 cents gold per cubic yard and cover a sufficient area for one dredge of 100,000 yards capacity a month. There is additional ground for three more dredges which will be taken up by the Sydney company as the final tests proceed.

The result of Mr. Park's report is a contract for the first dredge which will be constructed and installed as soon as possible.

The Ameari district is situated on the Ameari River which flows into Dingalong Bay. During the six months of April to September, conditions are very favorable. Transportation by water during those months is easily effected and it is very probable that the plant will be then shipped direct to Dingalong Bay from Australia during these months. The balance of the year is marked by heavy rains and storms on the east coast.

The district is accessible from Cabanatuan, Nueva Ecija, by trails over the Eastern range, the journey covering about two days from the line. There is little doubt that roads will be built into the district once its value as a gold producer warrants the outlay.

The claims are directly across the eastern watershed in Tayabas from the placer fields of Nueva Ecija, and points to a heavy mineralization of the eastern range.

West of the Ameari Option Co.'s property on the upper reaches of the river claims have been located and the owners have organized the Luzon Gold Company to engage in sluicing. Operations will commence in March.

The Headwaters Mining Co.—This company's plant has been shut down for some time, due, according to reports given out, to shortage of funds to carry on development and operation. No definite explanation has been made by the company's officials for suspending operations, but there is reason to believe that the finances would not be difficult of adjustment. The property is reported to be a valuable one and the plant fairly adapted to saving the values. The operations appear to have been in the preliminary stage when suspended so that no definite estimate is available of probable returns working under favorable conditions and at full capacity.

The suspension of operations at this stage is regrettable in view of its effect upon development in Benguet where very satisfactory results have been secured from the operations of small plants on other properties. Had the district escaped the severe storms of the last two years, there is little doubt but that there would have been a splendid showing from the district. This is especially true of the Benguet Consolidated that had arrived at the dividend paying point when the typhoon of 1909 destroyed the greater part of the plant. We understand that by the end of the present year arrangements will be concluded to install a new plant on a suitable and well protected point.

The Major Mines.—A report from Baguio is to the effect that the plant of this company turned out a 65½ oz. bar as the result of a nine day run, off the plates alone.

The Exploration Company's Dredge.—Mr. J. Peterson representing the New York Engineering Company arrived in Manila early this month for the purpose of superintending the construction of a dredge on the Gumaus property in Paracale. The steamer Harlesden has discharged a cargo of Oregon pine and 40 tons of hull fittings which will be used in constructing the pontoons. Works will begin at once.

Mr. Peterson has just completed the installation of a large dredging plant for his company in the Orsk district, Siberia. A tramway one mile long has been built on the property to facilitate transportation of materials and supplies.

The Gumaus property was secured under option two years ago by the Philippine Exploration Company. The price paid for the option was $50,000 which gave the latter the right to purchase the control at a price representing the necessary cost and expense of installing the dredging machinery and equipment.

The plans prepared for the Gumaus dredge call for 5½ foot close connected buckets, steam drive, with wood hull and framing. Features of the design provide ample deck room and large gold saving surface.

The New York Engineering Co. make a specialty of gold dredge building and has made most successful installations in almost every part of the globe.

The Colorado Mining Co.—This company has been operating a 100-ton plant on its properties in Aroroy, Masbate, continuously since December 1. The operations previous to that date were for the purpose of preliminary tests of the plant. For the first 24 days in December 2300 tons were treated and it is expected in a few months when stoping is undertaken to operate to its full capacity or from 100 to 120 tons daily. Definite information on results in values is not available beyond the fact that ₱33,000 was realized from the cleanup December 23 The process is cyanide allsliming by which the largest possible percentage of values is realized. The Colorado Mining Company's property and plant represent an investment of ₱600,000. The development of this property has been in progress for over six years and is probably in the most advanced stage of any property in the islands. By careful investigation of the proper treatment to apply to the character of ore, a plant was evolved that has been most satisfactory in its operation.

Masbate Activity.—The Eastern Mining Company continues active in development work and we understand that negotiations are under way for the purpose of installing a plant. A mining engineer is now engaged in investigating the property with a view to making recommendations as to method of treatment, etc.

The Cogon Company is making headway on development work and almost every prospect is passing to the stage of more or less development. This activity is largely due to the success of the Colorado Company.

The Camote Mine.—This company has not added any equipment to its plant which comprises a three stamp mill. The report from there for December gives the output at 72 ounces.

The Philippine Dredge.—The returns from the Malaguit maintains the monthly record of 200 ounces. According to reports testing shows increased values as the work proceeds.

THE FAR EASTERN RAILWAY NEWS

Singapore Railway—The Federated Malay States Railways authorities took over the lease of the Singapore Railway on January 1. A reduction in passenger rates is proposed, but no change is contemplated in freight rates. Among the improvements proposed is the construction of a large and commodious railway depot in Singapore. This section of line is the connecting link between Singapore and the F. M. S. system.

Manila Railroad Construction—The construction program of this company on the southern lines includes work on the line from Lucena to Legaspi, to be carried on in three sections simultaneously.

South Manchuria Railway Company—The tenth semi-annual meeting of this company was held last month and the following accounts were adopted and distribution of profits made:

	Yen.
Profit for the term	251,888
Balance brought over from last accounts	2,465,413
Total	2,721,301
To legal reserve	12,794
Dividend on the Government shares.	12,794
Dividend to shareholders (6 per cent. per annum)	60,000
Special reserve	500,000
Bonus to officials	18,000
Balance carried forward to next accounts	1,830,507

President Nakamura stated that the important undertakings accomplished by the company during the last term were the reconstruction of the Antung-Mukden line and the arrangement for the working of the Fushun collieries. The reconstruction of the railway line was achieved with steady progress and the through train service between Seoul and Mukden has been maintained since the first of November. Necessary arrangements for the working of the Fushun coal mine had also been perfected, and the working of Togo and Oyama collieries commenced, the daily output of the two mines being about 540 tons, which makes a total output of 3,500 tons a day of all collieries and not difficult to obtain a total production of 5,000 tons a day. The construction of factories on the Shaho is progressing.

During the term the company netted a profit of 255,000 yen out of the gross receipts amounting to 11,450,000 yen against 11,190,000 yen of disbursements. Compared with the previous term the figures presented a decrease of about 380,000 yen in the net profit. The decline in the receipts was on account of the storm damage, the outlay involved in the pest prevention fund, and the advance of the interest on company debentures, which showed an increase of over 1,300,000 yen. On the revenue side, the receipts from the railway and collieries business showed an increase of over 400,000 and 300,000 yen respectively. There was an increase also in the electric, gas, harbor, and other incidental business, though some deficit was experienced in hotels and some other lines. Out of the total receipts of 2,721,301 yen, including 2,465,413 yen balance brought over from the previous term, the directors recommended that 60 000 yen be distributed among the shareholders as a dividend at the rate of 6 per cent. The remainder has been distributed as follows:—12,794 yen to legal reserve; 300,000 yen to dividend to the shares held by the Government; 500,000 yen as special reserve and 18,000 yen as bonus to officials, the balance of 1,830,507 yen being carried forward to next term.

The following comparative tables will be of interest:

	Revenue for first six months in 1911. Yen.	Revenue in corresponding period in 1910. Yen.
Railway	6,324,123	5,594,769
Shipping	144,632	117,377
Mining	2,970,892	2,217,806
Harbour	540,162	474,080
Local	237,852	220,124
Hotel	139,3 7	113,327
Electricity	393,815	270,161
Gas	48,677	20 803
Miscellaneous	44,727	64,656
Interest	608,923	318,137
Total	11,453,160	9,411,240

The working expenses show a corresponding increase as indicated below:—

	Jan.-June, 1911. Yen.	Jan.-June, 1910. Yen.
Railway	3,323,302	3,015,331
Shipping	247,820	225,417
Mining	2,020,181	1,593 570
Harbour	540,814	417,795
Local	518,747	462,185
Pest prevention	142,329	—
Hotel	157,972	242,252
Electricity	297,203	242,252
Gas	30,505	17,053
Miscellaneous	86,451	39,099
General expenses	717,109	588,727
Interest on debentures	2,945,171	1,952,600
Margin of debentures issued	169,659	87,659
Total	11,197,272	8,883,940

The Amur Railway.—A British Consular report from Vladivostock gives the following review of this railway from the pen of H. M. Consul, Mr. R. M. Hodgson:

The Amur Railway, as it is now being built, follows a somewhat different route from the one originally intended *via* Sretensk and the Shilka. It now leaves the Karimskaya-Sretensk branch—which was constructed before the Russo Japanese war—where this crosses the Kwenga River, and bears inland, following the valleys of the Aleyur and Urium and the northern slopes of the Ksenyevsky Mountains. The line consists of four sections, namely:—Head section, 120 miles; western section, 395 miles; middle section, 423 miles; and eastern section, 318 miles—a total of 1,256 miles. It will, when completed, have five or perhaps six branch lines, counting as one of them the short piece of track between Kwenga and Sretensk. Work was begun on the head section in 1907, and towards the end of 1910 this section was opened for traffic, though the permanent way was in an unfinished and unsatisfactory condition; much more remains to be done before the line can be regarded as in proper order. Preparatory work was started on the western section—from Urium to Kerak—in the autumn of 1908 and was continued through 1909. It was anticipated that this section would be completed in the autumn of 1913. The middle section extends from Kerat to a point some 20 miles to the west of the Bureya. Preparatory work was commenced upon it in 1910 and is being continued throughout the present year. The route for the eastern section—terminating at Khabarovsk—was only definitely fixed towards the end of 1910 after prolonged surveying (see *Board of Trade Journal* of May 25 last, p. 421). What is known as the southern variant, which crosses the Bureya at the village of Kamenka, was finally adopted. Preparatory work was started upon it at the beginning of 1911, and it is calculated that it should be completed by 1915. Work is thus being carried on during the present year over the whole length of the line, and some 70,000 men are employed upon it. Of the branch lines, the eastern one to Tchasovinskaya was completed before the end of 1910, and the one to Reynova should be finished in 1911. The longest of the branch lines, which runs from Botchkoryova on the main line to Blagovestchensk, is also in progress, but is reported to be very backward, and it is unlikely that it will be in working order before the beginning of 1913. Commercially, the railway has no chance of paying its way, at all events for many years to come. It will be, however, a valuable economic asset, inasmuch as it will hasten the opening up of very large areas which to all intents and purposes have remained till now unknown. The western section and nearly all the eastern section are most unpromising; the country is wild and rough, and the climatic conditions are extremely severe. It is believed, however, that there exist very rich mineral deposits, which the construction of the railway will render accessible. The prospects on the middle section are much brighter, for it will improve communications with important goldfields in the Zeya and Bureya river systems, will traverse the very fertile region watered by these rivers, and already largely settled with peasant and Cossack communities, and by means of the branch line running to Blagovestchensk will develop relations with North Manchuria.

The line will ultimately be carried on along the north bank of the Amur to Nikolaievsk, while the navigation of the Lower Amur and the Amur estuary are to be improved. A complete system of communications by water and by rail will thus be established, uniting the centre of Siberia with the Pacific.

Australian Railways.—At the end of 1910 there were in New South Wales 3,754 miles of State-owned lines open for traffic, against 3,623 miles at the close of 1909. Private lines show little increase over the 141 miles for general and 124 miles for special service available in December, 1909. The revenue from the Government railroads in 1910 was $28,544,622, made up of passenger receipts $11,282,432 and *freight receipts* $17,262,190. The expenditure was $17,186,146, showing a profit of $11,358,476. The number of passengers carried was 56,168,040 and the freight and live stock 9,808,233 tons.

In the State of Victoria the new mileage opened for traffic during 1910 was 75, bringing the total at the end of the year up to 3,514 miles, at which time there were also approximately 196 miles under construction. The gross revenue for the year was $22,711,101, the expenditure $13,694,873. Of the total revenue $9,145,103 represented passenger earnings, the balance, $13,566,098, being the return from the freight, live stock, and parcels traffic.

Queensland shows railroad mileage increases during 1910 of 264, bringing that State's total up to 3,806 miles, 431 miles under construction at the end of the year and a further 2,009 miles authorized by Parliament but not yet begun. The gross revenue for the year was $12,456,705, and the expenditure $6,883,296, leaving a net profit of $5,573,409.

Western Australia reports 2,400 miles of railroad open for traffic at the close of the year ended June, 1910, a gain of 258 miles compared with the previous year, with approximately 475 miles authorized and under construction. The gross earnings were $7,957,443 and the expenditure $5,330,973, leaving a profit of $2,626,470.

Tasmania *made only small additions to* its railroad mileage during 1910. The lines open for traffic now show 470 miles. From this system the revenue last year was $1,380,546 and the expenditure $1,028,750, a balance to credit of $351,796.

In South Australia the total mileage open for traffic was 2,058, with 303 miles authorized and in course of construction. The earnings were $3,944,339 and the expenditure $5,196,020, showing a profit of $3,748, 319.

The revenue from the railroads of the Commonwealth is thus shown to have been $81,994,756, and the expenditure $49,320 058. From the railroads therefore the States of Australia benefited in 1910 by an amount approximating $32.674.698.

There is also 1,000 miles of private railways with a capitalization of approximately £4,000,000.

F. M. S. Cars de Luxe.—Vice-Consul General D. Milton Figart of Singapore gives the following description of the new sleeping cars recently secured for this system.

One of the new sleeping cars brought out from England in sections and put together at the Central Workshops, has now been placed in service on the Singapore Mail from Kuala Lumpur.

The car contains eight separate sleeping rooms on either side of a central passage. The rooms are shut off from the passage by doors, thus insuring privacy, and are very comfortably fitted up. Each contains two berths, with spring mattresses, one above the other, a large half-length looking-glass, a shut-up washstand which by an ingenious contrivance can be converted into a writing table, a folding stool, and step ladder for the upper berth. The rooms are brilliantly lighted by three small electric lamps and one big one and well ventilated by two windows with wire-gauze screens and blinds, as well as by a ventilator over the large electric lamp in the roof. By each bed are switches for the lights and electric bell pushes which communicate with a number board in the corridor. The sides of the rooms and corridor are paneled with English oak, while the bed rails are polished brass. In addition to the bedrooms, each car contains lavatories and a bathroom, with shower bath and cupboard with waterproof curtain for bathers' clothes.

The Trans-Australian Railways.—The line is to run from west to east, and to connect West Australia with the four States of the east. When the line is completed, there will be a through service between Perth and Adelaide; but for several hundreds of miles along the track there will be practically no byway traffic. The southern shores of West Australia are practically uninhabited, and for all the passengers there will be on the greater part of the line, the trains might as well make a non-stop run. For some time, of course, the line cannot possibly pay expenses, but that is not a conclusive argument against it. The reason for its existence is largely political, and it will certainly be of more effect in unifying Australia than any other item in the Government's political programme. From the commercial point of view, it remains to be seen whether the line will be able to compete at ordinary rates, in the carriage of passengers and freight with the great steamship companies. Another trans-continental line is under consideration, of very much the same character, from the south to Port Darwin in the Northern Territory. That project for results in the development of the neglected north of the continent will be more important than the East-and-West line.

Supply of Railway Materials.—The East Indian Railway Company have placed an order with Messrs. J. Butler and Co., Ld., England, for the supply of the steel work and materials required for the strengthening of the Sone Bridge. Messrs. Stableford and Company, Limited, Coalville are supplying the Eastern Bengal State Railway with the underframe and iron work, bogie trucks, etc., required for the construction of a special vehicle for the conveyance of boilers and heavy machinery over this line. Messrs. Horsehay Co., Ld., England, are manufacturing a sixty feet broad gauge through skew bridge girder span for the North-Western State Railway, which will weigh 55 tons, or nearly a ton per lineal foot. Messrs. Kendall and Gent, Limited, Victoria Works, Belle Vue, Manchester, have an order from the Bengal-Nagpur Railway Company, for the supply of radial drilling machine; Messrs. John Spencer, Limited, Wednesbury, have a contract for the supply of tubular poles, insulators and brackets to this line; and The Union Electric Co., Ld., for the supply of open arc lamps and lattice masts; while Messrs. Bertram Thomas, Limited, are supplying a switchboard feeder panel. The Yorkshire Copper Works, Limited, have a large order for the supply of brass and copper tubes to the East Indian Railway; and Messrs. P. and W. MacLellan, Limited, Glasgow, Clutha Works, for bolts, nuts, and rivets etc. Messrs. A. Everitt and Sons, Limited, had a contract for the supply of 150 cwts. of copper rods to the East Indian Railway; and Messrs. J. Brotherton, Limited, for the supply of 400 couplings for point rodding; while Messrs. E. Bailey and Co., Ld., have a large order for the supply of chain iron to this Railway. Messrs. Beyer, Peacock and Co., Ld., Manchester, Engineers, are supplying a slide bar grinding machine with countershaft and pulleys, etc., to the Eastern Bengal State Railway, and Messrs. Alldays and Onion Pneumatic Engineering Company, Limited, London, are supplying this line with a dozen Smith's Forges. Messrs. A. Ran some and Co., Ld., Stanley Works, Newark-on-Trent, and Victoria Street, London, have, we believe, a contract for the supply of an automatic mortising machine hollow chisel, to the Eastern Bengal State Railway.

GROWTH OF THE F. M. S. RAILWAYS.—From 1901 to 1910 the mileage advanced from 245 to 538; the proportion of working expenses to gross receipts began with 53.90, reached 70.34 in 1907 and 70.79 in 1909, and dropped to 60.82 in 1910; the profit on capital began with 5.82 per cent., fell to 3.18 in 1909, and rose to 6.82 in 1910, the highest having been 6.06 in 1903.

PRIVATE RAILWAYS IN JAPAN—Following is a table of private railways giving capitalization and length:

	Private railways.	Ditto under Provisional charter.	Light railways.
Number	10	3	107
	Miles.	Miles.	Miles.
Lines under charter	357.39	115.27	1,756.23
Lines opened to traffic	278.67	—	289.33
Unfinished lines	25.41	—	1.465.70
	Yen.	Yen.	Yen.
Authorized capital	34,910,000	9,900,000	80,346,125

JAPAN'S RAILWAY PROGRAM—With the six million surplus from last year, the four million from supplementary budget and the regular appropriation of yen 43,000,000, there is expected to be available about yen 53,000,000 for this year for the construction of new lines and the completion of lines under construction. The Jiji Shimpo announces that the Railway Board has decided to reconstruct the steep gradients on the Tokado line and convert the Shimbasi Shemonoseki line to standard gauge. Then there is the reconstruction of a branch line to Atami. The cost is estimated for this work at 24,630,000 yen. The reconstruction of the Tokyo-Yokohama line and the new stations at Osaka and Hyogo are also contemplated.

SIAMESE NORTHERN LINE.—According to the *Bangkok Times* Director General L. Weilers of the Royal Railways of Siam has concluded and examination of the proposed route for the continuation of the line to Chiengmai.

The proposed line from Dene Chai goes via Pang Buei, crosses the Meh Yome and the Meh Wang, and emerges on to the plain of Chiengmai through a tunnel nearly a mile in length. From Bangkok to Chiengmai the distance by the above route is 756 kilometres and from Dene Chai 225 kilometres.

There have been several surveys since Punchard made the first in 1889. He practically followed the recognised trail through Utaradit, Phre, Pang Buei, Nakon Lampang and so to Chiengmai. Much later Mr. Forsyth Martin surveyed the country. He followed the Punchard's route over Kao Plyng, then went along the Meh Yome and tried to find a route across the Muang Long hills. A second proposal of his was to build the line to Pichai as it is, then follow the Meh Yome and again try to discover a route through Muang Long. But the line was built to Utaradit. By the present route the line after passing Dene Chai will just touch the fringe of the Muang Long plain on its way to Pang Buei.

The first section of the Southern Railway extension from Perchaburi to Cha Alm, a distance of 23 miles, was opened to traffic on June 1, 1911. This is the first part of the new peninsular railway which will eventually link Siamese and Federated Malay State systems and form a direct connection between Singapore and Bangkok.

Branch lines are also under construction which will cross the Siamese portion of the Malay Peninsula. Lines will be completed within two years.

The traveling distance from Bangkok to the cities in the north of Siam is about 2 days to Phrae, 5 to Nakon Lampang, 8 to Chiengmai, 10 to Chiengrai, and 6 days to Narn.

Of the private railway companies the dividends for the year were 5 and 15 per cent for Moklong and Pocknam Railways, respectively.

LIGHT RAILWAYS IN JAPAN—In the Island of Kyushu there is great activity in opening up lines of communication especially in light railways. The result of the operations of a number of these with capital invested is as follows:

Asakura Railway, $106.000 (9 per cent;) Bungo Railway, $310,000 (8½ per cent); Chikugo Railway, $250,000 (8 per cent); Dai Nippon Railway, $725,000 (6 per cent); Dazaifu Railway, $15.000 (6 per cent;) Fukuhoku Railway, $375,000 (10 per cent); Hakata Railway, $500,000; Kokura Railway, $10,000 (22 per cent); Kikuchi Railway, $55,000; Kyushu Railway, $787.000 (5 per cent); Mitsumata Railway, $60,000 (6 per cent); Nanchiku Railway, $25,000 (10 per cent); Saga Railway, $20,000 (4 per cent); Shimabara Railway, $250 000; Tsuyasaki Railway, $22,000 (6 per cent); Yanagawa Railway. $37.000; Yutoku Railway, $80,000.

TYER'S RAILWAY SIGNAL EQUIPMENT IN THE EAST.—The South Manchuria Railway Company has placed an important order with Messrs. Tyer & Co., Ltd., through their local representative Mssrs. Samuel & Co., Ltd., for Signalling and Interlocking several stations on their system. The largest of the installation is at Tashihchao, where the interlocking apparatus will contain no less than 130 levers. A busy section of the Canton Kowloon Railway is equipped with Tyer's Automatic Tablet Instruments for Single Line Working. These Instruments are of the one wire type, and at each end of the section they give a constant indication of the direction in which the Train is travelling. By the withdrawal of the Tablet both Instruments become automatically locked, and they cannot be released until the Tablet has been inserted into the Instrument at the opposite and of the section.

FORMER SUPERVISING RAILWAY EXPERT FOR THE PHILIPPINES.—F. A. Molitor, formerly supervising railway expert for the Philippine Islands, has removed his office from 2 Rector Street, to 35 Nassau Street, New York City, where he will continue the general practice of civil engineering making a specialty of railroad work.

Mr. Molitor's career has been a remarkable one. His experience covers the duties of assistant engineer on the construction of the New York extension of the Baltimore and Ohio R. R.; principal assistant engineer on the Kentucky Central R. R.; engineer, maintenance of way Western Division, Chesapeake and Ohio R. R.; engineer, in charge of river and harbor work, and coal shipping terminals of the Philadelphia and Rea ing R. R.; engineer of construction Philadelphia Belt Line R. R ; engineer in charge of construction of the Montank Extension Long Island R. R.; chief engineer of the Choctao Oklahoma and Gulf R. R. and allied companies, including the construction, of 1,000 miles of new lines in Arkansas, Oklahoma and Texas; general manager and chief engineer of the Maland Valley R. R., including the organization, and construction of 300 miles of new railroad in Arkansas, Oklahoma and Kansas; supervising railway expert for the Philippine Government under commission of the Secretary of War to supervise the location and construction of 700 miles of railroad under Government subsidy.

TYER'S SIGNAL EQUIPMENT IN SOUTH AFRICA.—According to the Railway Gazette, the South African Railways have placed an order with Messrs. Tyer & Co., Ltd., which is now approaching completion, for a large number of their single line tablet machines for working the section of the railway between Randfontein and Fourteen Streams Railway. These machines are combination of absolute block-working and permissive-working, the latter in times of seasonal traffic enable nearly 40 trains to be sent consecutively in safety in one direction. The order also includes a number of crossing instruments, which allow two or more trains to cross at an intermediate point in a block section

FAR EASTERN ENGINEERING, CONSTRUCTION, COMMERCIAL AND FINANCIAL NEWS

ELECTRIC RAILWAYS, POWER, LIGHT, TELEGRAPHS, TELEPHONES, AEROPLANES, ETC.

THE ODWARA ELECTRIC RAILWAY.—One of the most difficult undertakings in short railway construction in Japan is the proposed electric line connecting Odawara and Gora in the Hakone mountains, which when completed will be four miles long and cost approximately 350,000 yen per mile. The route chosen involves the driving of fourteen tunnels and so precipitous is the country that besides the tunnels, elevators will be utilized to overcome natural obstacles. The line is proposed primarily for carrying tourist traffic and the scheme of construction will give the visitors all the benefit of scenic effects. Besides accommodating tourists the line will cut freight charges in half between Tokyo, Yokohama, and Odawara with Hakone.

YOKOHAMA ELECTRICO. CO.—At the general meeting of this company last month the following accounts were adopted and distribution authorized:

	Yen
Profit for the present term and the balance brought forward from the previous term	284,746
Legal reserve	13.859
Redemption fund	20.719
Bonuses	22 003
Dividend (11 per cent per annum)	214,940
Carried forward to next term	13,225

SHANGHAI MUNCIPAL PLANT.—The electrical engineer in his report for October directs attention to the increased capacity of the municipal generating station. He says:

—The generation plant, now that the new turbines are in regular operation and the Willans-Peebles turboalternator has been convert ed, is in a highly efficient condition. I am glad to be able to report that the conversion of the above referred to Peebles alternator has enabled us to increase the output from the machine, originally an 800 kilowatt one, up to 1,000 kilowatts without undue or dangerous overheating of either the stator or rotor windings. This is a concrete example of the overload capacity of steam turbines. The Howden-Siemens mixed pressure turbo-alternators, rated at 480 K.W. are continuously running at an output of 660 K.W. which on emergency can be increased to 700 K.W. This is a most satisfactory state of affairs. In a few days time the conversion of the Parson-Peebles 800 K.W. alternator will be completed, and I anticipate that we shall be able also to get 1000 K.W. output from this set. Then the combined output obtainable from the four turbine sets will be 3,320 K.W. although the rated and specified output is but 2,560 K.W. It is more than fortunate, it is extremely important that these increased outputs have been obtained because already in November the maximum lighting and power load in the station, excluding traction, has risen from 2,240 K.W. to 2,900 K.W., an increase of 660 K.W. within the past eleven months; before the end of the year a further demand of 200 K.W. will most probably have to be met.

Lloyds List for Aviators.—The announcement is made that Lloyds proposes inaugurating a register for aeroplanes along the same lines as registry of vessels.

Proposed Nagasaki City Railway.—Plans for the proposed street electric line are progressing and official sanction is expected this month following which work will begin at once.

The Odawara Electric Railways.—The number of passengers carried on its line during the term was 310,351 against 69,921 of the corresponding period of last year, bringing an increase of 10,400 yen in passenger receipts and of 988 yen in freightage revenue as compared with last year.

Again the receipts from the lighting business showed an increase of 1,707 yen, the company supplying altogether 11,844 electric lamps to 3,479 households, an increase of 954 lamps and 285 householders over last year. Besides, the company netted an increased income of 1,592 yen over last year from its power-supplying business. The accounts and distribution at the meeting last month follows:

	Yen.
Net profits	47,230
Balance brought over from the previous term	1,481
Total	48,711
Reserve	2,380
Bonus to directors	2,000
Dividend to shareholders	39,687
Preferential shares (10 per cent)	8,750
Ordinary shares (6 per cent.)	21,000
New shares (6 per cent.)	9,937
Balance carried forward	4,643

Manila Carnival Aviation.—A pupil o Captain Baldwin will appear at the carnival February 3. This exhibition will be supplemented by two aeroplane outfits being brought to Manila by the U. S. Signal Corps.

Electric Enterprises in Japan.—Official reports up to the end of September 30, 1911, place the number of companies at 1,016, totalling 472,205 kilowatts and a capitalization of yen 355,179,732 classified as follows:

	Number	Authorized capital *yen.*	Paid up capital *yen.*
Supply of Electricity	186	199,348,055	127,998,960
Electric tramways	15	25,110,000	14,297,500
Electric tramways and supply of current	25	130,721,678	99,353,239
Private use	697	—	—
Government use	93	—	—

The companies which have obtained charters but have not yet commenced business number 68, the electric power aggregating 381,232 kilowatts.

Tokyo Electric Light Co.—At the semi-annual meeting held last month the following accounts were adopted and distribution made:

	Yen.
Net profit for last term	397,337
Balance brought over from the previous term	1,566,483
Total	1,963,820

To be distributed as follows:—

To reserve	79,000
Dividend to shareholders (10% per annum)	1,525,000
Balance carried forward to next term	359,820

At the end of November the company had 601,175 incandescent electric lamps and 415 arch light lamps, and was supplying electric power aggregating 10,532 h. p., this showing an increase of 88,750 incandescent lamps, 18 arch light lamps, and 1,094 h. p. in electric power. And according to the latest statistice the number of electric lamps and quantity of electric power supply was increasing at the rate of 30,000 lamps and 250 h. p. a month. The chairman announced that on the completion of the second water-power station in June next the company would possess a capacity to supply 1,200,000 electric lamps and about 50,000 h. p. of electric power day and night, besides the lighting capacity of about 10,000 kilowatts.

Japanese Ballooning Corps.—The Military Ballooning Corps at Nakano, near Tokyo, will be divided into two departments next year, one of which will take charge of military ballooning, while the other will be entrusted with matters relating to aeroplanes and aeronautics, thus facilitating a more efficient study and investigation of the art of flying. The corps will be strengthened by experts of aviation, such as Major Koriyama, Captain Ishimoto, and others.

Aeroplanes for Chinese Revolutionists—Several Chinese students in Europe and America, trained in aviation, are reported on their way with outfits to join the revolutionary forces.

PUBLIC WORKS, DOCKS, WHARVES, BUILDINGS, ETC.

The Tanjong Pagar Board.—The new works completed comprise 500 feet of the west wharf. The electric power and light installations have been extended. On the main wharf lagoon, wet dock, and graving dock $3.518,775 have been expended.

Additional Piers for Manila.—The Collector of Customs in his report says: The two Philippine Government piers, Nos. 3 and 5, have continued in successful operation during the year 1911, notwithstanding the fact that it has been possible to accommodate thereat only vessels carrying cargoes from the United States and the regular Hongkong-Manila steamers. All other vessels carrying general cargo have been obliged to discharge at anchor in the bay, their cargoes being transferred to the customs warehouses by means of lighters.

The following statements show the number of vessels going alongside the piers during the fiscal year, and the receipts and expenditures in connection with the operation of the piers for the same period:

Vessels alongside piers.

Foreign vessels	353
Coastwise vessels	21
Government vessels	63
Total	437

Receipts and expenditures.

Gross receipts from operation	$18,992.73
Receipts from other sources	94.00
Total gross receipts from all sources	18,898.73
Total expenditures	15,104,11
Margin of profit	3,794.62

Two additional piers, to be not less than 850 feet long and 150 feet wide, would, in the opinion of the collector, permit of the handling over piers of all cargo which is now required to pass through the custom-house for examination, appraisal, and delivery. The construction of these two piers has already been recommended.

Irrigation in New South Wales—In the matter of irrigation New South Wales has as yet done comparatively little, although projects now on foot promise a large increase in irrigated acreage in the near future. At present the irrigation done is carried out by artesian wells, some Government owned and some private. The average depth of the Government wells is 1,893 feet and private wells 1.400 feet. The total area watered by this method is estimated at 3,000,000 acres, which, though apparently a large extent of country, represents only 1.5 per cent of the total land surface of New South Wales.

Tokyo Waterwork Extension—The Street Improvement Commitee of the Home Office has concluded its investigations into the Tokyo Waterworks extension schemes. The first is for the creation of a gigantic reservoir covering 313,400 *tsubo* in Okuno-mura, capable of holding 440 million cubic feet of water, the reserve being fed by the Tama and Aki rivers. The cost is estimated at 24,600,000 *yen*. The second plan is for the creation of two reservoirs—one at Murayama, covering 138,200 *tsubo*, capable of holding 133 million cubic feet of water, and the other covering 344 000 *tsubo* and capable of holding 510,450,000 cubic feet, the cost being estimated at 20.720.000 *yen*. It is calculated that by either plan it will be possible to supply water to 3,000,000 people at the rate of six cubic feet *per capita* on an average.

Keelung Harbor Improvement.—In 1899 the Diet authorized the expenditure of yen 2,000,000 to cover a period of four years in dredging the inner habor and the building of a breakwater at the entrance. In 1906 an appropriation of 6,200,000 yen was made to continue the work for a period of seven years. The outline of the works proposed under the last appropriation aceording to Consul Reat in the consular reports follows:

A quay wall 2550 feet in length is to be constructed between the new and old railway stations, and sheds and warehouses will be erected, where also electric capstans and cranes will be provided. Quay walls to accommodate junks and steam launches are to be constructed along the shore of Dai-Kelung for a distance of 2,460 feet; at Sho-Kelung, 5220 feet; at Gyuchoko, 732 feet. Along these walls 10 landing steps and numerous mooring buoys and rings will be provided for the small-boat and sampan traffic. The bottom of the sea between the old and new railway stations is to be dredged to the extent of 2,400 feet, with a depth of 30 feet at low water.

Two small islands, Haukan and Haubo, in front of the old railway station, are to be blasted and dredged 30 feet below low water All submerged reefs within steamers' anchorage will be removed. Ten buoys will be installed along the fairway to indicate the course; also, to afford a safe anchorage for steamers, 10 moorings will be provided in the inner harbor. Sheds and warehouses, provided with cranes, will be erected along the quay wall to facilitate the discharging and loading of cargo. A protecting sea wall 1,100 feet in length will be constructed at Senton-Bi (Senton Point), where an area of 3 or 4 acres will be reclaimed. It is expected that this wall will afford a safe anchorage for vessels inside the point.

By the completion of the harbor works, a water area of 17 acres, with a depth of 12 to 30 feet at low water, will be secured inside the point for anchorage of steam launches and junks; also an anchorage of 109 acres, with a depth of more than 30 feet at low water, will be provided inside the point, where five steamers, ranging from 3,000 to 6,000 tons may be accommodated alongside the quay wall and eight steamers of the same size at mooring buoys. Besides these, an area of 45 acres will be available for general anchorage. The sea bottom near Senton Point will be left in its present state of shallowness, except for the dredging of a fairway 480 feet wide to connect with the inner harbor. This shallow water, together with sea wall to be constructed at the point, may break the force of waves and protect the inner harbor.

In March 1910 the following works were completed:

A quay wall of 720 feet in length, with a height of 10 feet above low water of spring tide, has been completed in front of the new railway station, where the *Kama Kura-maru*, a steamer of 6,000 tons, came alongside for the first time in February, 1909. Since then all the regular mail steamers that ply between Kelung and Kobe are accommodated at this quay, giving improved facilities for the passenger and freight traffic. A quay wall 2,770 feet in length, with a height of 5 feet above low water of spring tide, has been constructed along the shore between Dai-Kelung and Sho-Kelung, for steam launches and junks.

Two small shallow and polluted streams that formerly drained the streets of Dai Kelung and Sho-Kelung, have been improved and converted into a canal of 1,770 feet in length, with a width of 90 feet and a depth of 4 feet below low water of spring tide. Along the bank of this canal, 3,144 feet of retaining wall were constructed, and five wooden bridges span the canal. Seventy-two acres of water area with a depth of more than 30 feet, and 44 acres with a depth ranging from 12 to 30 feet at low water have been obtained as the fairway and anchorage An area of 4 acres was reclaimed at Gyuchoko to be used as a general landing yard; also reclaimed land covering 3 acres has been secured along the quay wall that runs between the old and new railway stations.

The Panama Canal Construction.—The waterway will be opened for shipping July 1, 1913, if the landslips do not exceed the average experience. All the concrete work in the Gatun docks will be completed June 1, 1912, and in November 1912, the locks on the Pacific side will be finished with the exception of the gates. The Calebra Cut excavation is the most important work and with its completion, the canal will be thrown open. The building of docks and the facilities for transshipping merchandise are proceeding on a colossal scale. At Panama. on the Pacific side, docks are being built with an area of 270 acres. The dock piers at the Panama entrance will be 1,000 ft. long, so that even the *Olympic*, with its length of 880 ft., could be berthed there with a good deal of room to spare. At the Atlantic end there willbe five such double piers, capable of accommodating ten 1,000 ft. vessels. The electric cranes intended for these huge docks will be of enormous size and power. When actually going through the locks at Gatun, Pedro Miguel, and Miraflores—so as to raise the vessels to the height of the Gatun lake, which the canal taps on either side—the great steamships will be hauled through by powerful electric locomotives, which to gain greater tractive power will run on a toothed track laid along the top of the dock walls.

SHIPBUILDING, GENERAL MARINE, FISHERIES, ETC.

Dockyard Expansion in Japan—With the contract for the construction of a 27,000 ton battleship for the Japanese government, the Mitsubishi Dockyard and Engine Works will enlarge No. 3 dock from 714 feet in length to 800 feet and the width from 88 feet to 115. Reclamation work will proceed for a site in front of the present yards for the extension and additional machine shops.

This company has also secured a site at Yenoura on the Shimonoseki Straits where it is proposed to construct a dock 350 feet long and 60 feet wide to accommodate vessels up to 3,500 tons.

A new drydock 777 feet long, 111 feet wide, and 35 feet deep, is now under construction by the Government at Sasebo.

Kobe-Manila Line—The Philippine Government is using every endeavor to encourage a direct Japan-Philippine line of steamers and in this connection has published the following notice:

The Philippine Government is desirous of better steamship communication between the Philippine Islands and Japan. If regular service could be established between Kobe and Manila it is believed that a large business could be very shortly built up, as a saving in time and consequent interest costs and risk on the trip from Japan to Manila now generally made around by way of China should prove of great advantage to the commercial interests of the Philippine Islands. It is believed a reciprocal advantage to Japan should also interest the Japanese Government. While there is at present no appropriation for subsidizing such a line, the Philippine Government would be pleased to hear from any steamship company which desires to establish such service and know the terms upon which a service could be undertaken. It is possible that the Philippine Legislature, were the offer attractive, might consider a mail contract, a subsidy, or a guarantee of a minimum business which would result in securing this service. Any communications on this subject should be addressed to the Secretary of Commerce and Police, Manila.

South Sea S. S. Company.—Businessmen in Osaka and Kobe have decided to inaugurate the Nanyo Kisen Kaisha or South Sea Steamship Company with a capital of 3,000,000 *yen*. The capital is to be divided into 60,000 shares, of which 5,000 shares are to be placed on the market for public subscription. The company has for its object to run a steamship service to the South Seas, especially to South China.

New Chinese Cruiser.—The trials of the Chinese cruiser *Yin Swei*, built by Messrs. Vickers, Limited, at Barrow, took place Dec 2. This vessel was specially designed for the training of the officers of the Chinese Navy. She is fitted with a great variety of armament and machinery. She has two types of boilers, cylindrical and water-tube, six different types of guns, duplicated auxiliary machinery of different designs, and she is strongly protected. On her full-power trial she attained 21¼ knot speed, and on her low-power trial, with a little more than one-fifth of the total horse-power during 24 hours' steaming, nearly 12½ knots.

Tanjong Pagar Dockyards.—The report for the first half of 1911 states that 136 vessels were docked for repairs and painting, giving a total tonnage in dock daily of 796,717 as compared with 656,182 for the previous half year; the actual gross tonnage of vessels docked was 199,274. The four docks were occupied 533 days as compared with 442 in the previous half year.

Manila-San Francisco Service—The establishment of a sixteen day direct service between Manila and San Francisco is engaging the active interest of Manila merchants. The project was endorsed by Captain Robert Dollar of the Dollar Steamship Co. who recently made an investigation of the coastwise shipping trade of the archipelago.

Takoo Dock Activity—The Tencho Maru, a steel screw steamer built by the Taikoo Dockyard & Engineering Co., Hongkong, for the South Manchuria Railway Co., was launched on December 9. The vessel has a length of 255 feet over all, a moulded breath of 36 feet, a moulded depth to the main deck of 16 ft. 6 inches. The Tencho is of the continuous maindeck type, with top-gallant forecastle, bridge and tween decks both fore and aft. It has a gross tonnage of 1,200 tons and is fitted with triple expansion engines with two multi-tubular boilers developing a horse power of 1,000. It has been built to Lloyds' highest classification and the construction was under the special survey of Mr. J. Lambert, Lloyds' surveyor, Mr. T. Brayfield of Messrs. Carmichael and Clarke, and the Imperial Japanese surveyors. The accommodation is well appointed and includes five staterooms for first-class passengers while the saloon is situated under the bridge.

The Nippon Yusen Kaisha—At the half yearly meeting the extension of the company's fleet by twelve vessels was referred to by the the Chairman. One each of 6,000 tons are being built at the Kawasaki and Mitsubishi yards for the American line. Besides these there will be constructed two steamers of 10,000 tons each for the European service; two steamers of 3,000 tons each for the Shanghai run; two steamers of 6,000 tons each for the American run and two 8,000 ton vessels for the Australian line. With the opening of the Panama Canal the company will be prepared to operate lines from Yokohama to New York and to Brazil. This will necessitate an increase in capital of yen 50,000,000 or yen 60,000,000, an application for such increase having already been submitted to the government.

The gross profits of the company for the past half-year amounted to Y. 4,600,676.213, out of which has to be deducted, depreciation of the company's fleet and property Y. 928,390.330, insurance fund Y. 416,854.120 and ships structural repair fund Y. 576,667.680. Thus, including the balance of Y. 851,389 473 brought forward from the last account the balance available for distribution is Y. 3,530,156.556.

Pacific Mail Purchases Steamer.—The Pacific Mail has purchased the S. S. Nile of the Royal Mail Packet Co. until recently employed in the West Indies trade, to take the place of the foundered Asia. The dimensions of the Nile follow:

Length, 420.0 ft. Breadth, 52.2 ft. Depth, 33.5 ft. Gross tonnage, 5,888. Net tonnage, 3,135. Speed, 16 to 16½ knots. Indicated h. p. 10,000.

She is a steel built vessel with three masts and two funnels. Messrs. J. and G. Thomson, Ltd., Glasgow, built the ship in 1893. She has a promenade deck 217 ft. long, poop 42 ft. long and forecastle 73 ft. long. She is fitted with wireless telegraphy, refrigerating machinery and electric light throughout. There is accommodation for 215 first-class passengers, 36 second-class and 368 third. There is one cabin de luxe on the promenade deck, and also a first class ladies' boudoir and a smoking room. The main deck is taken up almost entirely by first class staterooms, among which are four cabins de luxe. The poop is reserved entirely for second-class passengers, smoke room, ladies' boudoir and dining saloon for their sole use. She is eminently suitable for the trans-Pacific trade. Every stateroom is provided with a fan and large air ports. It remains to be added that the vessel is fitted with hydraulic cranes, ensuring no noise when discharging cargo. The steamer left Southampton on the 13th inst., and is due in Hongkong on January 20th.

The Shanghai Dock & Engineering Co.'s Activities.—The new U. S. Army Inter-island Transport Merritt, built for service in the Philippines by the Shanghai Dock & Engineering Company, was launched at Shanghai, January 6. The contract was awarded in April, 1911, to be completed in 12 months. The first keel plate was laid in July. The vessel is 300 feet over all, breadth moulded, 45 feet, and depth, 28 feet 3 in. The hull is built of steel with six water tight bulkheads and the upper and awning decks are steel throughout sheathed in teak. The vessel will have first class passenger accommodation for 50 passengers and berths for 350 soldiers. The contract speed is 12.5 knots.

El Varadero de Manila Gets Contract.—The contract for the construction of six sea going lorchas for the Insular Lumber Co. was awarded El Varadero de Manila. The contract price was ₱200,000. Each lorcha is to have a carrying capacity of 250,000 feet of hardwood lumber.

British Docking Facilities in the Far East.—Setting forth Singapore's adaptability as a naval base the *Singapore Free Press* directs attention to her docking facilities including the new dock there nearing completion which will be large enough to accommodate superdreadnoughts, and submits a list of the most important British docks in the East as follows:

Durban.—A floating dock, and at 812 knots distance a new dock 750 ft. by 95 ft. by 30 ft. at Simon's Bay. Durban is chosen as an ideal base on account of its position regarding a fixed rendezvous.

Colombo.—A dry dock able to take any existing or at present projected warship 708 ft. by 85 ft. by 32 ft.

Sydney.—The Sutherland Dock 638 ft. by 84 ft. by 32 ft.

New Zealand.—The Wellington Dock 683 ft. by 84 ft. by 42 ft.

Hongkong.—(Advanced Base.) The Kau-Lung Dock 700 ft. by 30 ft. The Admiralty Dock at Honkong is too short to take an *Invincible* by 5 ft only and might be (or is being) enlarged.

Singapore.—The new Dock (as yet unnamed), 860 feet by 100 feet by 35 feet.

New Osaka Shosen Kaisha Steamer—The Annam Maru, sister ship of the Shosen Maru, was launched in England in October. Her carrying capacity is 5,000 tons, length 315 feet, breadth 44 feet, and depth 27 feet 3 in. She will be fitted with triple expansion engines with cylinders 22", 27" and 61" by 11" 6" long to work at a pressure of 180 lb. Her speed will be 10 knots.

MINES, MINERALS, METAL TRADE, MACHINERY, ETC.

Straits Trading Co.—The first half yearly report of this company as reorganized covering the term ended September 30, 1911, shows a net profit of $471,843.82 and with $87,445.53 forward from previous account made $559,289.42 available for distribution. Out of this a dividend of $1 and a bonus of 50 cents a share, absorbing $450,000, were directed paid; $25,000 transferred to employes bonus account, and the balance carried forward. The reserve fund which stands at $1,500,000 was considered sufficient to meet any contingency and was not augmented.

Pusing Lama Tin.—The report for the year ending June 30, 1911, follows:

During the year under consideration, the tributors have produced approximately 5,188 piculs or 308¾ tons of black tin, which has provided the company with a revenue by way of tribute of £7,321 12s. 1d. A further revenue of £4,326 5s. 11d. has been obtained from customs crushings, rents, and sundry receipts.

After deducting the expenses of administration, both in the Federated Malay States and London, the accounts show a profit of £7,363 18s. 7d., from which must be deducted £1,744 1s. 10d., written off machinery, buildings and furniture accounts. This leaves a balance of £5,619 16s. 9d. to be carried to balance sheet, to which is added £4,755 15s. 0d. from last year, making the balance of profit £10,375 11s. 9d. From this amount the directors have declared and paid an interim dividend amounting to £2,500. which leaves a balance of £7,875 11s. 9d. to be carried forward to next year.

The Gopeng Tin Mining Co. Ltd—A synopsis of the directors' report for the year ended July 31. 1911, follows:

The profit for the year has again been a record one, amounting to £32,545. 0. 8, and after allowing for the sum of £1,975 being profit on the sale of the company's holding of 1,000 shares in New Gopeng, Limited, is still £8,136. 8. 9. in excess of any previous record. After paying the usual quarterly dividends of 1/6 per share, equal to 30 per cent. per annum, the balance carried forward is £20,280. 0. 10:

Menglebu Lode Tin—For the year ended September 30, 1911, the gross profits from mining operations for the period under review were $69,632.74 and after providing for the usual establishment expenses and making a very liberal allowance carried for depreciation, the balance amounts to $37,470.27 which with the balance carried forward from last leaves a sum of $38,012-24 at the credit of profit and loss account.

New Method of Gold Extraction.—Vice Consul General Henry D. Baker on special detail in New Zealand describes an invention being tested in that colony.

The machine works much on the same principle as flour-milling machinery, in rejecting, rubbish by throwing it out through percussive and vibratory motion. In place of the stones at present in the false bottoms of sluice boxes; there is a system of balls, running in channels, so set that they can not bunch up or hang together, but move continuously, keeping the matter treated moving all the time, and insisting on precipitation by their resistance to every particle of metal or mineral carried to them by the run of the water. The ceaseless motion of the balls is given by two mechanical operations on the part of the machinery working the plant; one of the motions is percussive and the other vibratory, there being no suggestion of a rotary action or of an up-and-down motion. Every movement is in the direction of throwing the values back and throwing drosses off. The percussive movement has the effect of drawing the weighty substances in the direction of the blow.

The apparatus consists of a series of large trays, the bottoms of which are channeled, the channels being filled with the balls previously mentioned for keeping up the agitation conducive to the quick precipitation of values. A system of springs and tensions gives percussive and vibratory effects to the trays, dispelling the gangue in the direction of the flow of the water and drawing the metal values to the next tray, where there is another grading and a similar general treatment, varied in the detail to suit the class of matter being dealt with. The result of the working of the trays is a product, in values, easily handled for concentration on any of the ordinary vanners.

The machine thus explained is the invention of E. J. Swyny, of the Mineral Reclamation Works, Rozelle, New South Wales.

Coaling Depots at Panama.—As the act of June 28, 1902, contemplates the construction of terminals for the canal, any addition to the docks should be such as to form a part of the final scheme, which should also include coaling facilities and a dry dock as necessary adjuncts to the canal. A board was appointed on April 24, 1911, to consider and report on the facilities that will be necessary in connection with the use of the completed canal, so that after the general scope and characteristics of these facilities have been adopted such work as may be needed may be undertaken. These facilities were to include the storing and furnishing of coal and other fuel for use both afloat and ashore; the furnishing of fresh water to shipping; the furnishing of adequate and convenient facilities for the repair of all vessels, as well as of all rolling stock, equipment, and machinery ashore; and the question of storehouses and storing of material and supplies on the Isthmus (other than fuel) for all other purposes after the completion of the canal.

A comprehensive scheme was outlined having in view the construction at the Pacific terminus of a dry dock, the permanent shops, and a storehouse for supplies. A coaling station is contemplated at each end and an arrangement of docks which will permit of subsequent additions. The dry dock is to conform in its dimensions to the locks, and the wharves are to be of sufficient dimensions to care for any shipping which can use the canal; in other words, the docks are to have lengths of 1,000 feet and depths of water equal to the depths provided in the channels of approach.

On the Atlantic side it was decided that the docks should be within the limits of the Canal Zone, located so as not to interfere with traffic through the canal and at the same time to enable shipping to lie at them in safety during storms. Designs were prepared for the construction of a mole extending in a general westerly direction to the canal prism from the intersection of the shore by the line separating the Zone from Colon and of dimensions sufficient to protect against storms both the docks and the basin which will be excavated to the south of them.

Burma Gold Dredging.—A statutory general meeting of the shareholders of the Burma Gold Dredging Company was held in Rangoon in accordance with the Articles of Association of the Company. As this company was reconstituted on May 2, 1911, under the name of the Burma Gold Dredging Company, (1911). Limited, it was imperative upon the Directors to hold the meeting. The present position of the Company appears to be healthy, for at the present date there is a credit balance of nearly Rs. 50,000. It is stated that the company will dredge below Myitkyina, and will not prospect the concession above this place for the simple reason that the Directors think that there is a larger portion of dredgable ground below Myitkyina than above it and hence would be much easier and more economical to work.

Foreign Capital in Korean Mines.—There was an increase in the number of licenses issued in 1910 to 744 compared with 575 in 1909 as follows: American, from 14 to 22; Japanese from 365 to 404; Koreans 145, to 249; Koreans and Japanese from 34 to 45; English, from 5 to 11; German, from 6 to 7.

Tongkah Harbor Tin Company.—The gross returns for the year were £76,139 and the net £57,628. An increased dividend is expected.

Raub Gold Mines.—The report from the Koman and Malaca for the four weeks ended December 2 show a saving in values of 748 ounces.

West Sumatra Mining Syndicate.—The *Java Times* reports that this company recently paid a dividend of 80% and a bonus of 15%.

The Hanyang Iron Works.—A correspondent of the *Shanghai Mercury* states that neither the Hanyang Iron Works nor the Yangtze Engineering Works have been seriously damaged as the result of the fighting in that zone. One hole is reported in No. 3 furnace of the Hanyang works and the walls only of the Engineering Works are damaged. All the machinery appeared intact.

Coaling Piers at Moji.—The Kyushu railway administration have completed plans for the construction of three T-shaped piers 150 feet in length about 35 chains off Shirakizaki. The maximum slope will be 30 feet and rotary bands 3.1/2 feet wide for loading vessels from the coal sheds will be installed to develop a coaling capacity of 24,000 tons per diem.

Eastern Smelting Co. Ltd.—The first general meeting of this new company that has taken over the interests of the old organization July 20 was held in London October 25, the formal transfer being made October 2. The net profit for the period from January 1 to July 26 was £8,737 but was not available for dividend as it was realized before the employment of the new capital.

Chinese Asbestos Mines.—Three mines are in operation near Antung but the output is small owing to the antiquated methods employed. The product is reported of good quality and sells at Antung at about 60 cents gold a pound.

Oil Consumption on the Panama Canal. The Isthmian Canal Commission makes the following announcement·

The number of lubricating, illuminating, and miscellaneous oils and greases received and standardized by the Commission and Panama Railroad is 21, of which 10 are lubricating, 2 illuminating, 4 miscellaneous oils, and 5 are greases, including nonliquid oil.

Lubricants and oils are standardized as follows: Valve, air-compressor cylinder, marine, stationary, locomotive, turbine, and gas-engine oils; crank case, car, transformer, lard, ammonia cylinder, and crude oil; greases—nonliquid oil, cup, gear, cable, and crank-pin grease; illuminating—signal and kerosene oils; gasoline.

Of the above mentioned oils, 12 are received by the commission in 50-gallon steel drums, and 3 in cases of two 5-gallon cans each. Three kinds of greases are received in barrels, and 2 in 25-pound cans. Crude oil is supplied to the different points in containers convenient for the work required, drawn from crude-oil tanks located on the Isthmus.

The approximate monthly consumption and use of each grade by the Commission and the Panama Railroad is as follows:

Valve oil, 5,350 gallons; for the internal lubrication of all steam valves and cylinders.

Air-compressor cylinder oil, 150 gallons; for the internal lubrication of air cylinders.

Surigao Placer Mining Co.—This company owns placer land in Cansuran district, of a character amenable to hydraulic mining. The district is said to be rich in gold and evidence of this is found in the large quantities sold to traders by the natives.

FINANCIAL, COMMERCIAL AND MISCELLANEOUS NEWS.

The Manila Gas Franchise—As the result of competitive tenders for a gas franchise covering the City of Manila and the province of Rizal, the award went to the Schweizerische Gasgesellschaft, Zurich, Switzerland. The price paid was ₱125,000. Construction is to begin within nine months and operation in 23 months. A site has been secured for the plant in Paco.

The Ewo Cotton Spinning Co.—The report for the year ended October 31, 1911, follows:

The Balance at Credit of Profit and Loss is Tls. 212,345.73, which it is proposed to deal with as follows:—

	Tls.
To pay dividend on Preference Shares at rate of 7% per annum	27,611.38
,, pay a dividend of Tls. 7 00 per share on 15,000 Ordinary Shares	105,000 00
,, place to Special Repairs and Renewals Account	30,000 00
,, place to Equalization of Dividend Account	40,000 00
,, write off Furniture Account	763 94
,, earry forward to new account	8,970.41
Total	212,345.73

Malanao Coconut Co.—This company was registered in Manila with a capital of ₱200,000 in shares of ₱100.00 each to engage in agriculture.

Philippine Bamboo Concession Available—The Director of Forestry has issued a circular describing a tract of 1,200 hectares covered with bamboo suitable for paper pulp, in the province of Bataan, available to concessionaires desirous of installing a pulp mill. Investors may secure an exclusive license for 20 years on liberal terms.

W. H. Anderson & Co. Incorporates.—The old established American firm of Messrs. W. H. Anderson & Co. of Manila has been incorporated with a registered capital of ₱600,000. The incorporators are Messrs. W. H. Anderson, Leon Rosenthal, F. A. Thompson, Pedro Botelho and R. T. Anderson. The company has absorbed the importing business of Messrs. Sullivan & Francis. W. H. Anderson & Co. represent the leading manufacturers of the United States and are the Philippine representatives of the Green Island Cement Co. They have just completed a fine two story concrete structure for an office building on the site previously occupied.

Mindanao Lumbering Enterprise.—Messrs. Pujalte & Co. of Manila have installed a large sawmill on Taba Bay where the company enjoys extensive timber concessions. The mill represents an investment of ₱120,000 and has a capacity of 50,000 feet daily.

The Fuji Cotton Mill.—This company's report for the last half year follows:

Gross receipts	817,067
Disbursements	112,876
Net profit	704,291
Balance brought over from last term	64,886
Total	769,177
To be distributed as follows:—	
Legal reserve	35,214
Reserve against losses	35,214
Bonus and relief funds for employes	35 214
Bonus and pension funds for officials	35,214
Bonus to directors	35,214
Dividend to shareholders (10% per annum)	500,000
Balance carried forward to next term	93,107

Okinawa Sugar Co.—The Government has sold to the Okinawa Sugar Company the Okinawa Sugar factory. The price of 100,000 yen. It is reported that the Department of Agriculture and Commerce, which annually expended about 90,000 yen in the maintenance of the factory, will in future invest the fund for the development of sugar industry in the island in the of bounties.

Iloilo Chinese Enterprise—Articles of incorporation were filed last month by Lim Panzo and Co. with a capital of ₱800,000 to engage in general commercial and agricultural lines.

Philippine Budget for 1912—Governor General Forbes made allotments covering ₱·17,427,788 for the year.

Commission Government for Zamboanga.—A new charter has been granted the Moro capital which provides for a similar form of government to that for Manila and Baguio. The city will be governed by an alcalde and two commissioners.

Manila's Annual Income.—The total income for the fiscal year 1911 amounted to ₱4.716,798 of which ₱1,250,000 was contributed by the Insular Government.

Philippine Currency Circulation.—According to the report of the Iusnlar Treasurer the sum of ₱54,482,270 17 was in circulation in December an increase of ₱1,800,000 over the previous month. Of this amount the Bank of the Philippines is responsible for ₱3,567,171.70

Manchurian Trade.—The trade of Manchuria for 1910, as shown by the Maritime and Native Customs returns, amounted to $109,830,706 United States currency, compared with $102,060,117 for 1909. Of this sum the net foreign imports formed $37,480,457, compared with $31 417,297 for 1909, and the native imports $16,189 721, against $16,198,808 in the preceding year, making the total imports $53,670,178, in contrast to a total of $47,616,105 for 1909. Exports were valued at $56,160,528, of which products worth $36,361,811 went to foreign countries and $19,798,717 to Chinese ports. The corresponding figures for 1909 were: Total exports, $54,444,012; shipments to foreign countries, $35,335,310; to Chinese ports, $19,108 702.

Banque Sino-Belge.—The balance-sheet of the Sino-Belge Bank to June 30, 1911, shows profit balance of f.784,167, to be distributed as follows:—Legal reserve, f.42,084; provision for licence, f.10,000; four per cent. dividend upon 30,000 shares of f.500, f 600,000; statutory allocations, f.100,016; carried forward, f.132,060.

Castle Bros Wolf & Sons Reorganize—This wellknown firm was reorganized and incorporated at a capitalization of ₱4,000,000 and will be known as the Pacific Commercial Co. The representatives of the old firm secured ₱2,598,000 of stock in the new company and a million pesos of Boston capital were invested in the business. The balance of the stock is held in reserve. Messrs. Castle Bros Wolf & Sons have been engaged in business in the Philippines for over 12 years and the increase in capital is an evidence of the faith of the company in the future of the islands. The firm has branches in San Francisco, Australia, Japan, Cebu and Iloilo. We expect soon to open branches in New York, London and Hongkong.

Philippine Society of Engineers—The annual meeting of the society was held January 8. This society has now a membership of over 150. H. P. Linnel, Chief Engineer for the Atlantic Gulf Pacific Co., was elected President; W. H. Robinson, city engineer, vice-president; Geo. H. Guerdrum, sanitary engineer of the Bureau of Health, secretary; and and C. W. Keith, chief of the division of engineering design Bureau of Public Works, trustee to serve for three years.

SEWERAGE SYSTEM FOR HAVANA, CUBA.

Henry R. Worthington, 115 Broadway, New York, has just forwarded to Havana, through the Cuban Engineering & Contracting Company, the well-known contractors who have in charge the sanitization of the City of Havana, three (3) of the largest pumping units ever exported from this country for such service.

Each of these units consists of a 36″ special Worthington vertical-shaft, double-suction impeller, volute, centrifugal pump, with equipment of shafting, couplings, bearings, etc.

Each pump has a capacity of 46,000,000 gallons per 24 hours, and is arranged for connection to 42″ suction pipes and 36″ discharge pipes.

Each of these machines will be operated by a 240-KW. General Electric vertical motor, direct connection being made between the hydraulic and electric rotors.

Included with these three (3) units will be all necessary accumulators, triplex and centrifugal oil pumps, with motors, complete oil feed and oil filter systems, special electrical controlling devices, etc.

These equipments will be placed in a station located at Casa Blanca, across the Bay from Havana City.

All the sewerage from the City will be delivered to this station through tunnels underneath the harbor and the mammoth pumps described will then force the same across the ridge back of Casa Blanca and far out to sea.

The pumps in question were designed and manufactured under the direction of the ablest and most expert hydraulic engineers and, undoubtedly, represented the highest grade ever reached in the production of this class of machinery.

All details of the machines were subjected to the closest scrutiny throughout the entire period of their manufacture, especial attention being given to the matter of high efficiency.

THE KAMAISHI IRON AND STEEL WORKS

(Continued from page 260)

vertical engine, and one set of 10 inches mill of three high system driven by a horizontal compound engine. Shears, saws, and other auxiliary machinery are all equiped. Furnaces are tapped three or four times per 24 hours and thus produce 20 to 30 tons for the small, and 25 to 35 of tons of ingots for the large furnace. Ingots are cast from the bottom, and each weighs only about 650 pounds. Sections rolled are bars, squares, flats, angles, and rails of small size.

The Basic linings of the open hearth furnaces consist of magnesite bricks imported from Germany and sometimes of domestic chrome bricks. For the roof, silica bricks of English make and partly those of their own make are used. They are now able to have over two hundred heats per furnace.

THE ANALYSIS OF MILD STEEL:

	No. 1	No. 2	No. 3
Carbon	0,38	0,20	0,12
Silicon	0,14	—	—
Phosphorus	0,04	0,04	0,04
Sulphur	0,04	0,03	0,03
Copper	0,24	0,25	0.24
Manganese	1,10	0,62	0,60

Pipe casting Department.—This department was set up in 1903, and has developed so rapidly that it has grown to be the largest pipe foundry in this country, the maximum capacity amounting to 50 tons per day. Regarding the quality of pipes, our reputation stands first. The undeniable soundness of the pipes might be attributed to the nature of the pig iron which is universally recognized to produce very strong and tough castings.

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SUGAR MACHINERY
Honolulu Iron Works.

SUPERHEATERS
Babcock & Wilcox Ltd.

TANKS
Pacific Tank and Pipe Co.
Shanghai Dock & Engineering Co., Ltd.
U. S. Steel Products Co.

TELEPHONES
The Western Electric Co.
The Philippines Telegraph & Telephone Co.

TILES AND BRICKS
Green Island Cement Co., Ltd
Chinese Eng. Mining Co.

TOBACCO DEALERS
British American Tobacco Co., Ltd
Cia. General de Tabacos
Olsen & Co., Walter E.

TOOLS
American Tool Works Co.
Lodge & Shipley Machine Tool Co.
Shanghai Machine Co.
Easterbrook Allcard & Co., Ltd.
The Selson Engineering Co. Ltd.
Shanghai Dock & Engineering Co. Ltd.

WINDMILLS
Fairbanks, Morse & Co.
Defiance Machine Works.

WATER SOFTENERS
Babcock & Wilcox Ltd.

WATER, MINERAL
Isuan.

WOOD WORKING MACHINERY
American Tool Works Co.
Defiance Machine Works.
Lodge & Shipley Machine Tool Co.
Shanghai Dock & Engineering Co. Ltd.